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Performance of primary care in different health care facilities: a cross sectional study of patients' experiences in Southern Malawi.

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Performance of primary care in different health care facilities: a cross sectional study of patients’ experiences in Southern Malawi.

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ABSTRACT

Objective: In most African countries, primary care is delivered through a district health system. Many factors, including staffing levels, staff experience, availability of equipment and facility management, affect the quality of primary care between and within countries. The purpose of this study was to assess the quality of primary care in different types of public health facilities in Southern Malawi.

Study design: This was a cross sectional quantitative study.

Setting: The study was conducted in 12 public primary care facilities in Neno, Blantyre and Thyolo districts in July 2018.

Participants: Patients aged 18 years and above, excluding the severely ill, were selected to participate in the study.

Primary outcomes: We used the Malawian primary care assessment tool to conduct face to face interviews. ANOVA at 0.05 significance level was performed to compare primary care dimension means and total primary care scores. Linear regression models at 95% CI were used to assess association between primary care dimension scores, patients' characteristics and healthcare setting.

Results: The final number of respondents was 962. Patients in Neno hospitals scored 3.77 points higher than those in Thyolo health centers, and 2.87 higher than those in Blantyre health centers in total primary care performance. Primary care performance in health centers and in hospital clinics was similar in Neno (20.9 vs 19.0, $p = 0.608$) while in Thyolo, it was higher at the hospital than at the health centers (19.9 vs 15.2, $p < 0.001$). Urban and rural facilities showed a similar pattern of performance.

Conclusion: This results showed considerable variation in experiences among primary care users in the public health facilities in Malawi. Factors such as funding, policy and clinic level interventions influence patients’ reports of primary care performance. These factors should be further examined in longitudinal and experimental settings.

Key words: Primary care; primary care performance; primary care assessment tool; patient experience measurement; health services, Malawi.

ARTICLE SUMMARY

Strengths and limitations of the study

- The study provides insight into patients’ perspective of primary care performance thereby complimenting clinical health outcome measures in evaluation of health service performance.
- This study used a culturally adapted and locally validated measurement tool which has been widely used globally.
- There might have been potential for selection, response and recall bias as the data were collected from patients in a clinic setting; however, the face to face interviews provided opportunity for follow-up clarifying questions to minimize it.

BACKGROUND

Primary care is first contact, continuous, comprehensive, coordinated care that is provided to populations undifferentiated by gender, disease or organ system.¹ Strong evidence suggests that effective primary care is associated with improved equity and access to healthcare services, reduced hospitalizations and better cost effectiveness.²⁻⁵ Primary care is also considered as a vehicle for accelerating progress towards universal health coverage.^{6,7}

73 In most African countries, primary care is delivered through a district health system. At primary
74 level facilities, health care workers (HCWs) and community health workers (CHWs) provide
75 integrated preventive and curative services to a geographically defined population under the
76 supportive supervision of a district hospital and district health management team and with active
77 participation of the community.⁸

78 The quality of primary care between and within countries is affected by many factors. In a recent
79 study in several African countries, staffing levels, staff experience, availability of equipment and
80 facility management were some factors that accounted for variation in the quality of primary
81 care.⁹ In the US healthcare setting, it was found that health centers generally achieved higher
82 quality of primary care while primary care in hospitals was associated with less continuity.¹⁰
83 Similar results were found in a Chinese study which showed that community health centers
84 provided better quality primary care when compared with secondary and tertiary health care
85 facilities.¹¹ In a South African study, public rural and urban primary care users had similar
86 experiences of quality. This was attributed to standardized service packages and treatment
87 guidelines within the sector.¹²

88 Malawi has in the recent past registered notable progress particularly in HIV/AIDS and child
89 health indicators.¹³ However, significant persisting challenges include poor access to services,¹⁴
90 inequity and inadequate financial risk protection.^{15,16} The new 2017-2022 national health sector
91 strategic plan (HSSP II) seeks to achieve universal health coverage and improved patient
92 satisfaction.¹⁶ As no studies have been conducted in Malawi to compare patients' experience of
93 quality of primary care in the different settings of the public health sector, the results of this
94 study contribute to the HSSP II goals. The study is also a baseline of the experiences of patients

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95 with regard to the performance of primary care in the southern Malawi and thus provides a basis
96 for quality improvement in service delivery.

97 The purpose of this study was to assess the quality of primary care in different types of public
98 health facilities and to discuss implications of the findings in the context of using the district
99 health system model to achieve universal health coverage in the South West health zone in
100 Malawi. Study objectives were to compare primary care performance between districts, between
101 rural and urban health centers and between hospital clinics and health centers; and to assess the
102 association between primary care performance and characteristics of the primary care facilities.
103 The null hypothesis for the study was that there is no difference in performance of primary care
104 between the different types of health care facilities.

105 **MATERIALS AND METHODS**

106 **Study design**

107 This was an observational quantitative cross sectional study and we used the STROBE cross
108 sectional reporting guidelines¹⁷ to report the results.

109 **Sampling procedure**

110 The study was conducted in 12 facilities in three districts in the South-west health zone in July
111 and August 2018. The South West health zone includes the districts of Nsanje, Chikhwawa,
112 Mwanza, Neno, Blantyre, Thyolo and Chiradzulo in total serving a population of about 3 million.
113 Two districts were purposefully selected. Neno receives the highest per capital funding in
114 Malawi due to additional resources from the NGO Partners In Health (PIH)¹⁸ and Blantyre
115 because it has an urban population. In addition, Thyolo was selected randomly from the
116 remaining 5 districts.

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3 117 The 3 public hospitals Thyolo and Neno district hospitals and Lisungwi community hospital
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5 118 were purposefully selected on the basis of being the only public hospitals offering primary care
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7 119 within the study area. In Blantyre, Ndirande, Zingwangwa, Chilomoni and Limbe health centers
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9 120 were randomly selected among 9 public urban health centers. In Neno, Magaletta and Ligowe
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11 121 were selected randomly from 11 public health centers. In Thyolo, Bvumbwe, Mangunda, and
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13 122 Amalika were selected randomly from 16 public health centers.
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17 123 The study population included adult patients attending outpatient care in public health centers
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19 124 and hospitals in the selected districts. Study participants were at least 18 years of age, must have
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21 125 used the facility for at least six months and must have visited the facility for at least 3 times.
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23 126 Patients with acute illness or with severe mental health disorders were excluded to allow them
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25 127 receive the urgent care that they needed.
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27
28 128 Systematic random sampling was used. There was no booking system for outpatients in the
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30 129 facilities where patients were seen. Patients reported to the outpatient clinics directly and
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32 130 received services on first come first served basis. Prior experience showed that the questionnaire
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34 131 would take about 20 minutes to administer. Each interviewer was therefore expected to conduct
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36 132 12 interviews per day. The number of waiting patients at the beginning of each day was used as
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38 133 the sampling frame. A sampling interval (n) was derived by dividing the number of waiting
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40 134 patients by 12. A random starting point was obtained using a smart phone random number
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42 135 generator. Each 'nth' patient was then asked for consent to participate in the study.
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46 47 136 **Sample size determination** 48

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50 137 The sample size was calculated based on findings from a previous paper that compared PCAT
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52 138 scores between patients in county, secondary and tertiary hospitals and rural health and
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community health centers.¹¹ The minimum sample size of this study was estimated as 900 with a 95 % confidence interval and a power of 80 % and considering 2.5% incomplete or missing data.

Data collection and instruments

We used the Malawian version of the primary care assessment tool (PCAT-Mw) whose validation was reported in another paper.¹⁹ The PCAT-Mw is a multi-item multi-dimension questionnaire that measures primary care performance covering core dimensions of primary care (attached as supplementary file: validated PCAT-Mw items). The tool has 29 items measuring primary care performance in seven dimensions: first contact access (3 items), communication continuity of care (4 items), relational continuity of care (4 items), coordination (3 items), comprehensiveness of services available (6 items), comprehensiveness of services provided (6 items), and community orientation (3 items). First contact access is here defined as the manner in which services are organized to accommodate access whenever needed and ensure patient satisfaction. Continuity of care entails the existence of a regular source of care and the longitudinal relationship between primary care providers and patients, in terms of accommodation of patient’s needs and preferences, such as communication and respect for patients. Coordination of care reflects the ability of primary care providers to facilitate and support patients to navigate use of other levels of health care when needed. Comprehensiveness of primary care services represents the range of services available in primary care to meet patients’ health care needs. A distinction is made between services that are available and those that are actually provided. Community orientation defines the extent to which the primary care providers understand and address priority health problems in a particular community with evidence of community participation.

Items are scored on a 4-point Likert scale, with 1 indicating “definitely not,” 2 indicating “probably not,” 3 representing “probably,” and 4 representing “definitely.” Additionally, there are questions to identify the usual primary care facility the patient uses and the patient’s sociodemographic data.

Data collection was done through face to face interviewer administered questionnaire from eligible patients in July 2018. Research assistants with prior interviewing experience received a 2 day refresher training before the start of data collection interviews.

Study variables

Study outcome measures were mean scores of each primary care dimension and the total primary care score. Independent variables included sociodemographic characteristics: age, sex, education, employment status of the patient and or the head of the household, patient’s disability status; healthcare measures: acute or chronic presentation, duration of contact with facility, estimated time taken to get to the facility, frequency of visits in the past 2 years, satisfaction with care and self-rated health status (SRH). Data were also collected on district characteristics such as location (rural/urban), catchment population, number of healthcare workers, number of community healthcare workers and estimated per capita health funding.

Data entry and Statistical analysis

Data analysis was done using the IBM SPSS Statistics 25.0.0 (2017) package. For consistency with methods used in PCAT studies in other countries, a mid-scale value of 2.5 was assigned to “not sure” answers while the mean item score was used for missing data.²⁰⁻²³

First, chi-square analyses were applied to compare socio-demographic, healthcare and health characteristics of patients in the different types of facilities. Primary care dimension mean scores were derived by dividing the sum of the item means by the number of items in the dimension. A

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3 184 score ≥ 3 was considered ‘acceptable to good performance’ and < 3 as ‘poor performance’.^{12, 25}
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5 185 Total primary care was calculated as the sum of all dimension mean scores. Next, independent
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7 186 sample T-tests and ANOVA were performed to compare performance of primary care
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9 187 dimensions in different types of health care facilities. Multiple linear regression models were
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11 188 then used to assess the association between types of facility and performance of primary care
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13 189 dimensions after controlling for patients’ socio-demographic, healthcare, and health
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15 190 characteristics.

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20 191 **Patient and public involvement.**

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22 192 We did not involve patients and the public in the design of the study

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25 193 **Ethical approval and consent to participate**

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27 194 Ethical approval for the study was granted by the Malawi National Health Sciences Research
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29 195 Committee (NHSRC): 18/03/1993.

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32 196 District Health Officers also gave permission for the study in their respective districts. Study
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34 197 participants provided written consent.

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38 198 **RESULTS**

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40 199 This paper presents results from 962 completed questionnaires out of 1001 potential respondents
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42 200 that were approached. Those that declined cited lack of time to participate. Missing data
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44 201 accounted for approximately 1.2 % of all data.

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47 202 **District characteristics**

48
49 203 Table 1 shows that Neno had the highest density of both primary HCWs and CHWs followed by
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51 204 Blantyre for HCWs and Thyolo for CHWs respectively. With regards to funding, Neno received

about 3 times as much total per capita healthcare funding as Thyolo and Blantyre respectively during 2017 – 2018 financial year.

Table 1: Structural and organizational characteristics of primary care facilities in South West health zone, Malawi in July - August 2018

Facility	Type of facility	Location	Catchment population	Number of HCWs ^a (per 1000 pop)	Number of CHWs ^b (per 1000 pop)	District per capita health funding in US\$ per year
Neno						
1	Hospital	Rural	20 711	9 (2301)	143 (145)	60
2	Hospital	Rural	11 284	4 (2821)	112 (101)	
3	Health center	Rural	14 433	3 (4811)	98 (147)	
4	Health center	Rural	8 936	4 (2234)	58 (154)	
Thyolo						
5	Hospital	Rural	51 318	21 (2444)	24 (2139)	22
6	Health center	Rural	19 444	1 (19444)	14 (1389)	
7	Health center	Rural	47 092	8 (5887)	29 (1624)	
8	Health center	Rural	52 782	7 (7540)	22 (2399)	
Blantyre						
9	Health center	Urban	78 561	25 (3142)	37 (2123)	18
10	Health center	Urban	79 675	33 (2414)	41 (1943)	
11	Health center	Urban	135 726	31 (4378)	44 (3085)	
12	Health center	Urban	145 821	23 (6340)	46 (3170)	

^a: Healthcare workers (CHWs) comprised nurses/nurse-midwives/medical assistants/clinical officers

^b: Community health workers (CHWs) comprised health surveillance assistants and community health volunteers on stipend

Demographic and healthcare characteristics of participants

Table 2 compares the distribution of patient characteristics for the five types of health care settings. Sixty-four percent of primary care visits were from females and over 80% of patients were between 18 and 45 years of age. Among rural patients, 81% were affiliated to their primary care facilities for longer than 4 years compared to 55% among urban patients. Fifteen percent of respondents in Blantyre had 5 years or less of education compared to 37% among Thyolo health centers respondents and 45% in Neno health centers. About 60% of patients in Neno walked for more than 1 hour to their facility compared to 48% in Thyolo and 17% in Blantyre.

Table 2 Demographic, socioeconomic, and health measures of the patients attending clinics in South West health zone, Malawi, in July and August, 2018 shown by type of facility

Characteristic	Total (N=962) (%)	Neno hospitals (n = 151) (%)	Neno health centers (n = 152) (%)	Thyolo hospital (n = 132) (%)	Thyolo health centers (n = 226) (%)	Blantyre Urban health centers (n = 301) (%)
Sex						
Female	616 (64.0)	89 (58.9)	107 (70.4)	78 (59.1)	145 (64.2)	197 (65.4)
Male	346 (36.0)	62 (41.1)	45 (29.6)	54 (40.9)	81 (35.8)	104 (34.6)
Age**						
18- 30 years	448 (46.6)	70 (46.4)	79 (52.0)	35 (26.5)	99 (43.8)	165 (54.8)
31 - 45 years	342 (35.6)	56 (37.1)	46 (30.3)	63 (47.7)	70 (31.0)	107 (35.5)
46 – 60 years	128 (13.2)	16 (10.6)	18 (11.8)	25 (19.9)	45 (19.9)	24 (8.0)
Above 60	44 (4.6)	9 (6.0)	9 (5.9)	9 (6.8)	12 (5.3)	5 (1.7)
Education**						
None	108 (11.2)	34 (22.5)	28 (18.4)	17 (12.9)	20 (8.8)	9 (3.0)
Up to 5 years primary	206 (21.4)	29 (19.2)	40 (26.3)	37 (28.0)	64 (28.3)	36 (12.0)
5 – 8 years primary	302 (31.4)	38 (25.2)	59 (38.8)	40 (30.3)	88 (38.9)	77 (25.6)
At least secondary	296 (36.0)	50 (33.1)	25 (16.5)	38 (28.8)	41 (23.9)	179 (59.4)
Employment status**						
Part-time or full time	273 (28.4)	30 (19.9)	46 (30.3)	35 (26.5)	54 (23.9)	108 (35.9)
Self employed	395 (41.1)	53 (35.1)	84 (55.3)	75 (56.8)	103 (45.6)	80 (25.6)
Home maker	293 (30.5)	68 (45.0)	22 (14.6)	22 (16.6)	69 (20.5)	113 (37.5)
Duration of facility affiliation**						
6months to 2 years	153 (15.9)	10 (6.6)	16 (10.5)	15 (11.4)	23 (10.2)	89 (29.6)
2 – 4 years	107 (11.0)	14 (9.3)	7 (4.6)	15 (11.4)	26 (11.5)	45 (15.0)
>4 years	702 (73.0)	127 (84.1)	129 (84.9)	102 (77.2)	177 (78.2)	167 (55.4)
Number of clinic visits in 2 years**						
3 – 5	413 (42.9)	49 (32.5)	60 (39.5)	60 (45.5)	78 (34.5)	166 (55.1)
>5	549 (57.1)	102 (67.5)	92 (60.5)	72 (54.5)	148 (65.5)	135 (44.9)
Time to travel to facility**						
<30 mins	316 (32.8)	31 (20.5)	35 (23.0)	34 (25.8)	71 (31.4)	145 (48.2)
30 – 60mins	247 (25.7)	26 (17.2)	29 (19.1)	24 (18.2)	62 (27.4)	106 (35.1)
>60mins	399 (41.5)	94 (62.3)	88 (57.9)	74 (56.0)	93 (41.2)	50 (16.7)
Disability (physical, mental)**						
No	850 (88.4)	143 (94.7)	130 (85.5)	94 (71.2)	217 (96.0)	266 (88.4)
Yes	112 (11.6)	8 (5.3)	22 (14.5)	38 (28.8)	9 (4.0)	35 (11.6)
Self-rated health**						
Poor(VP/P/F)	466 (48.4)	57 (37.7)	62 (40.8)	63 (47.7)	125 (55.3)	176 (58.5)
Good (G/VG)	496 (51.6)	94 (62.3)	90 (59.2)	69 (52.3)	101 (44.7)	125 (41.5)
Patient satisfaction**						
Poor (VP/P/F)	475 (49.4)	58 (38.4)	61 (40.1)	70 (53.0)	128 (56.6)	158 (52.3)
Good (G/VG)	487 (50.6)	93 (61.6)	91 (59.9)	62 (47.0)	98 (43.4)	143 (47.7)

*P<.05. **p<.01, based on Chi-square test of difference across healthcare settings

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224 Primary care performance by district

225 Table 3 compares primary care performance at the district level through total PCAT-Mw and
 226 individual dimension mean scores. Patients in Neno reported a significantly higher total primary
 227 care performance at 20.3 (n = 303, 95% CI 20.0, 20.6) compared to both Thyolo and Blantyre at
 228 16.8 (n = 358, 95% CI 16.4, 17.2) and 16.4 (n = 301, 95% CI 16.1, 16.7) respectively (p =
 229 <0.01). This same difference was found in all but one (relational continuity) of the primary care
 230 dimensions measured. In Neno, acceptable performance was reported in first contact access
 231 (3.1), communication continuity (3.6), coordination (3.1) and community orientation (3.2). Poor
 232 performance was reported in relational continuity (1.9), comprehensiveness of services available
 233 and provided, at 2.7 each.

234 There was no significant difference between Thyolo and Blantyre with regard to total primary
 235 care performance. Patients in Thyolo reported significantly higher scores relative to patients in
 236 Blantyre in relational continuity (2.0 vs 1.6, p<0.01) and comprehensiveness of services provided
 237 (2.5 vs 2.3, p<0.05) but patients from Blantyre reported higher scores in first contact access (2.5
 238 vs 2.3, p<0.05) and comprehensiveness of services available (2.2 vs 2.0, p<0.05). Both Blantyre
 239 and Thyolo had acceptable performance score (3.4) in communication continuity. Poor
 240 performance was reported in other primary care dimensions in both districts. The lowest scores
 241 were reported in coordination (1.8 and 1.7).

Table 3: Primary care dimension mean scores in South West health zone, Malawi, in July and August, 2018 shown by district.

Characteristic	Total (95%CI)	Neno (95%CI)	Thyolo (95%CI)	Blantyre (95%CI)
Sample size	962	303	358	301
First contact – access	2.6 (2.5, 2.7)	3.1 (3.0, 3.2)**	2.3 (2.2, 2.4)**#	2.5 (2.4, 2.6)**#
Communication continuity	3.4 (3.3, 3.5)	3.6 (3.5, 3.7)*	3.4 (3.3, 3.5)*	3.4 (3.3, 3.5)*
Relational Continuity	1.8 (1.7, 1.9)	1.9 (1.8, 2.0)**	2.0 (1.9, 2.1)##	1.6 (1.5, 1.7)**##
Coordination	2.0 (1.8, 2.2)	3.1 (2.8, 3.4)**	1.8 (1.5, 2.1)**	1.7 (1.5, 1.9)**
Comprehensiveness				
Services available	2.3 (2.2, 2.4)	2.7 (2.6, 2.8)**	2.0 (1.9, 2.1)**#	2.2 (2.1, 2.3)**#
Services provided	2.5 (2.4, 2.6)	2.7 (2.6, 2.8)**	2.5 (2.4, 2.6)**#	2.3 (2.2, 2.4)**#
Community orientation	2.9 (2.8, 3.0)	3.2 (3.1, 3.3)**	2.8 (2.7, 2.9)**	2.7 (2.6, 2.8)**
Total PCAT-Mw score	17.5(17.3, 17.7)	20.3 (20.0, 20.6)**	16.8 (16.4, 17.2)**	16.4 (16.1, 16.7)**

Based on ANOVA Bonferroni post-hoc means test:
*P<0.05, **P<0.01 comparing Neno and Thyolo and Blantyre;
P < 0.05, ## P<0.01 comparing Thyolo and Blantyre

Primary care performance in rural and urban facilities

Table 4 shows the bivariate results comparing primary care dimension scores in health centers to highlight differences between urban and rural settings. Patients in Neno reported a significantly higher total primary care performance at 20.9 (n = 152, 95% CI 20.4, 21.4) compared to both Thyolo and Blantyre at 16.8 (n = 226, 95% CI 14.8, 15.6) and 16.4 (n = 301, 95% CI 16.1, 16.7) respectively (p = <0.01). Neno health centers also reported better performance in all of the primary care dimensions. In Neno, acceptable performance was reported in first contact access (3.0), communication continuity (3.6), coordination (3.6) and community orientation (3.1). Poor performance was reported in relational continuity (2.3), comprehensiveness of services available

(2.4) and comprehensiveness of services provided at 2.9. Blantyre and Thyolo health centers reported acceptable performance only in communication continuity (3.4). Both districts reported poor performance in the other dimensions and coordination was lowest (1.7).

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Table 4: Primary care dimension mean scores in South West health zone, Malawi, in July and August, 2018 comparing rural and urban health facilities.

Characteristic	Total (95%CI)	Neno Health centers (Rural) (95%CI)	Thyolo health centers(Rural) (95%CI)	Blantyre Urban Health centers (95%CI)
Sample size	962	152	226	301
First contact – access	2.6 (2.4, 2.7)	3.0 (2.9, 3.1)**	1.8 (1.7, 1.9)***	2.5 (2.4, 2.6)***
Communication continuity	3.4 (3.3, 3.5)	3.6 (3.5, 3.7)	3.4(3.3, 3.5)	3.4 (3.3, 3.5)
Relational Continuity	1.8 (1.7, 1.9)	2.3(2.1, 2.5)**	1.8(1.7, 1.9)**	1.6 (1.5, 1.6)**
Coordination	2.0 (1.8, 2.2)	3.6(3.3, 3.9)**	1.7(1.4, 2.0)**	1.7 (1.5, 1.9)**
Comprehensiveness				
Services available	2.3 (2.2, 2.4)	2.4(2.3, 2.5)**	1.4(1.3, 1.5)***	2.2 (2.1, 2.3)***
Services provided	2.5 (2.4, 2.6)	2.9(2.8, 3.0)**	2.5(2.4, 2.6)**	2.3 (2.2, 2.4)**
Community orientation	2.9 (2.8, 3.0)	3.1(3.0, 3.2)**	2.6(2.4, 2.7)**	2.7 (2.6, 2.8)**
Total PCAT-Mw score	17.5 (17.3, 17.7)	20.9 (20.4, 21.4)**	15.2 (14.8, 15.6)***	16.4 (16.1, 16.7)***

Based on ANOVA Bonferroni post-hoc means test:

*P<0.05, **P<0.01 comparing Neno and Thyolo and Blantyre;

P < 0.05, ## P<0.01 comparing Thyolo and Blantyre

Primary care dimension scores in hospital and health center clinics

Table 5 shows results of primary care dimension scores compared between hospitals and health center clinics. Because of the performance differences between the districts as noted above, Neno and Thyolo are compared separately. There is no public hospital in Blantyre. Health centers and hospitals performed equally well in both districts in communication continuity and equally poorly in comprehensiveness of services provided. Hospitals performed

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3 275 better than health centers in both districts in community orientation and comprehensiveness of
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5 276 services available. Thyolo hospital also performed better in first contact access, relational
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8 277 continuity, coordination and total PCAT-Mw scores than health centers. Coordination and
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10 278 relational continuity were reported better in health centers than hospitals in Neno. The only
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12 279 difference between Neno and Thyolo hospitals was a better relational continuity in Thyolo.
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15 280 Table 5: Mean primary care dimension mean scores among patients attending outpatient clinics in South
16 281 West health zone, Malawi, in July and August, 2018 shown by hospital and health center clinics.
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Characteristic	Neno hospitals (SE)	Neno Health centers (SE)	P value	Thyolo hospital (SE)	Thyolo health centers (SE)	P value
Sample size	151	152		132	226	
First contact – access	3.1(0.05)	3.0 (0.05)	0.308	3.1(0.07)	1.8 (0.05)	<0.001**
Communication continuity	3.6(0.05)	3.6 (0.05)	0.816	3.5(0.07)	3.4(0.06)	0.371
Relational Continuity	1.6(0.06)#	2.3(0.08)	<0.001**	2.3(0.08)#	1.8(0.06)	<0.001**
Coordination	2.5(0.27)	3.6(0.17)	0.001*	2.2(0.27)	1.7(0.17)	<0.001**
Comprehensiveness						
Services available	3.1(0.05)	2.4(0.05)	<0.001**	3.1(0.06)	1.4(0.04)	<0.001**
Services provided	2.7(0.08)	2.9(0.07)	0.085	2.5(0.06)	2.5(0.07)	0.753
Community orientation	3.3(0.07)	3.1(0.06)	0.025*	3.2(0.08)	2.6(0.06)	<0.001**
Total PCAT-Mw score	19.0 (0.18)	20.9 (0.25)	0.608	19.9 (0.31)	15.2 (0.20)	<0.001**

282 Based on ANOVA Bonferroni post-hoc means test
283 *P<0.05. **P<0.01 comparing hospitals and health centers;
284 # P < 0.05 when Neno and Thyolo hospitals compared.
285

286 Figure 1 is a radar chart showing dimension performance according to the different settings. The
287 figure shows that the differences between the contexts were most evident in first contact access,
288 coordination comprehensiveness of services available. Neno health centers performed better than
289 the other facilities in coordination.
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Legend: (Figure 1. Mean primary care attribute scores among patients attending outpatient clinics in South West health zone, Malawi, in July and August, 2018 shown by hospitals and health center clinics)

Multivariate analyses of primary care dimension mean scores

Table 6 presents the results of the multivariable linear regression analyses used to assess the association between facility characteristics and primary care total and dimension performance mean scores after controlling for patients' sociodemographic and healthcare and health characteristics.

Using Neno hospitals as the reference, the coefficient for Thyolo health centers was -3.77 , and -2.87 for the health centers in Blantyre. Thus, patients in Neno hospitals would have on average an estimated 3.77 points greater score than those in Thyolo health centers, and 2.87 greater score than those in Blantyre health centers. The variables studied explained 30% of the variances observed with regard to total primary care scores.

With respect to dimensions, similar results were seen in coordination of care, first contact access and comprehensiveness of services available. In these dimensions, the studied variables studied explained 22.4%, 37.7%, 54.4% of the variances observed.

DISCUSSION

This study assessed the performance of primary care as experienced and reported by patients in different types of public health facilities in three districts in the South West health zone in Malawi. We used an internationally recognized and locally validated tool, PCAT. When performance was compared among the three districts, Neno achieved a significantly higher total primary care score than Blantyre and Thyolo respectively. Patients in Neno also reported

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3 312 acceptable scores in first contact access, communication continuity of care, coordination and
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5 313 community orientation compared to good performance in only one dimension (communication
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7 314 continuity of care) in Thyolo and Blantyre.
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10 315 These results can partly be explained by the significantly higher per capita health funding that
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12 316 Neno currently receives compared to the other districts. Similar conclusions were made when
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14 317 Neno was compared to other districts in program performance outcomes in maternal and child
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16 318 health¹⁸ and HIV care indicators²⁶ in previous studies.
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19 319 Another related possible explanation is the low HCW: patient- and CHW: patient ratios observed
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21 320 in Neno. Staffing levels were among factors that were identified to have affected quality of
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23 321 primary care in a study in several African countries including Malawi.⁹ Achieving Malawi's
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25 322 HSSP II goals of better health outcomes and patient satisfaction will therefore require more
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27 323 investment to increase healthcare spending above the national average of 40 US\$ per capita
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29 324 which is the lowest in the SADC region¹⁶ since it is known that increase in public healthcare
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31 325 spending has a long-lasting impact in low-resource communities²⁷ and is associated with better
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33 326 health outcomes.²⁸
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39 327 Performance of primary care in health centers was compared to highlight differences between
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41 328 urban and rural settings. The better performance reported in Neno health centers is probably due
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43 329 to the same factors as described in the paragraphs above. Blantyre and Thyolo districts had
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45 330 similar per capita funding and HCW: patient and CHW: patient ratio. The pattern of performance
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47 331 is also similar across all primary care dimensions although differences in scores among
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49 332 individual dimensions resulted in higher total primary care in the urban facilities. The similar
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51 333 pattern of performance is likely because of the just noted similarities in their primary care inputs.
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54 334 In addition to having similar available resources, standardized protocols and clinical guidelines
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are used by the HCWs who provide primary care and would have received similar training.

Results of a South African study on organization and performance of primary care in the Cape Town region, where standardized protocols were used, also did not show a significant difference in experiences of patients from rural and urban settings.¹² This probably implies that equitable distribution of resources is more important than the setting per se in the quality of services that patients experience.

We also compared primary care experiences among patients attending health center and hospital clinics. This was done by using facilities in Neno and Thyolo. Health centers play an important gate-keeping role that is essential to well-functioning health systems. In this study, health centers from Thyolo scored lower than the hospital clinic in total primary care and all of the individual dimensions except communication continuity of care. In most districts, the peripheral facilities face more acute challenges than the district hospital. A qualitative assessment of PHC in Malawi found that some of the challenges that peripheral facilities experienced were inadequacy of supplies, shortage of personnel, poor quality of infrastructures and unavailable transport and communication equipment.²⁹ The same study also found that health partners preferred district level to health center level implementation thereby exacerbating uneven distribution of resources. The poor performance in health centers may also be a result of people's lack of trust in primary care providers and their services.

In Neno, total primary care was similar at the hospitals and health centers. There were however differences in performances between the two levels among the individual dimensions with health centers doing better in relational continuity and coordination of care. Smaller facilities tend to favor relational continuity and coordination of care.³⁰ Funding and staffing levels are likely not the only factors that impact on patients' reporting of primary care performance. Further

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3 358 prospective studies could explore the reasons for the similarities in primary care performance
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5 359 between the hospital clinics (Neno and Thyolo) and health centers in Neno.
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8 360 The differences in primary performance reported by patients from different types of health
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10 361 facilities held true in this study irrespective of the patients' socio-demographic and healthcare
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12 362 characteristics. Among the primary care dimensions, first contact access and comprehensiveness
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14 363 of services available contributed more to the observed variation. The factors that were assessed
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16 364 explained 37.7% and 54.4% of the variances in first contact access and comprehensiveness of
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18 365 services available respectively. This is a suggestion of some order of importance among the
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20 366 dimensions at least as shown in this study. Utilization, coordination and continuity of services
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22 367 can only effectively take place when people have access to the services that they need. WHO
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24 368 states in its report on universal health coverage that the first objective is that everybody should
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26 369 be able to access a full-range of quality health services.³¹ A systematic review of the literature on
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28 370 the dimensions of primary care by Kringos et al concludes that a hierarchy of importance could
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30 371 be observed. The hierarchy consisted of access to primary care services, the comprehensiveness
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32 372 of services available and provided, continuity, and coordination of care.³² The improvement of
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34 373 access to services that people need is therefore a reasonable step towards improving quality of
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36 374 primary care.
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43 375 Access and comprehensiveness of services largely depend on the facility infrastructure,
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45 376 availability of medical supplies, adequate supply of appropriately trained primary health care
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47 377 workers (including community health workers). On the other hand, continuity of care,
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49 378 coordination and community orientation depend on the local clinic operations.³³ Improving
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51 379 primary care in Malawi will therefore require both policy and clinic level interventions. The
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53 380 results of this study also showed that there was no significant difference in communication
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continuity across the different types of facilities. This dimension also performed well across all facilities. A possible explanation for this might be the similar preservice training that primary care providers receive regarding patient-provider communication. Further studies could explore the role of preservice training interventions in affecting the quality of primary care delivered.

The strength of this study lies in the use of a culturally adapted and locally validated tool which has been used widely globally to assess performance of primary care from patients' perspective in many different settings. Additionally, it is the first time that this kind of study has been undertaken in the 3 districts. The results of this study therefore provide insight into patients' perspective of primary care performance thereby complimenting clinical health outcome measures in evaluating quality of health services.

The study had a number of limitations. First there is potential for bias in the data. Recall bias could occur as the patients were asked to provide information not only from current but also from historical experience. The face to face interview partly minimized recall bias through clarifying questions whenever that was necessary. Potential for response bias was possible because data collection was done onsite during a clinic visit. Selection bias might have resulted from excluding those who were acutely ill, frail or had severe mental illness and interviewing only patients who attended clinics. Secondly, a cross-sectional study is an efficient way of obtaining a large sample. However, it is not possible to make causal inferences from the analysis. Thirdly, this was a study of patient experiences of primary care and not of disease specific clinical outcomes. Further studies could assess correlations between clinical outcomes and patient experiences of care and the extent to which patient experiences predict later health outcomes. Fourth, there could be unmeasured confounding factors that might affect patients' experience of primary care other than those studied.

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CONCLUSION

Despite these limitations, the findings of this study are helpful in providing insight in the performance of primary care in different types of public facilities in Malawi. This paper showed that there is considerable variation in experiences among primary care users in the public health facilities in Malawi. Factors such as funding, policy and clinic level interventions influence patients’ reports of primary care performance. These factors should be further examined in longitudinal and experimental settings.

ABBREVIATIONS

ANOVA	Analysis of Variance
CHW	Community Health Worker
HCW	Health Care Worker
HSSP	Health Sector Strategic Plan
NGO	Non-Governmental Organization
NHSRC	National Health Sciences Research Committee
PCAT	Primacy Care Assessment Tool
PCAT - Mw	Primary Care Assessment Tool – Malawian version
PIH	Partners In Health
SADC	Southern Africa Development Community
WHO	World Health Organization

Table 6: Linear regression models assessing association between sociodemographic, healthcare, health factors, primary care dimension mean scores and types of health facilities with unstandardized beta values among 962 patients attending outpatient clinics in South West zone, Malawi in July – August, 2018

	Total Primary care	First contact access	Communication continuity	Continuity Relational	Coordination	Services Available	Services Provided	Community Orientation
	B (SE)	B (SE)	B (SE)	B (SE)	B (SE)	B (SE)	B (SE)	B (SE)
Reference	17.12(0.55)	3.10(0.14)	3.47(0.15)	1.77(0.16)	2.96(0.51)	3.05(0.11)	2.39(0.19)	3.37(0.17)
Sex (Ref: M) ^a								
Female	-0.29(0.20)	0.04(0.05)	-0.09(0.05)	-0.11(0.06)*	0.25(0.21)	-0.09(0.04)*	-0.08(0.07)	0.03(0.06)
Age(Ref: 18 – 30 yrs) ^a								
30 – 45yrs	-0.24(0.21)	0.08(0.05)	-0.15(0.06)**	0.02(0.06)	-0.14(0.18)	-0.01(0.04)	-0.13(0.07)	-0.05(0.07)
45 – 60yrs	-0.35(0.30)	-0.01(0.07)	-0.31(0.08)**	0.09(0.09)	0.10(0.28)	0.05(0.06)	-0.12(0.10)	-0.05(0.09)
>60yrs	0.07(0.45)	0.09(0.11)	-0.04(0.12)	0.13(0.13)	-0.46(0.47)	-0.01(0.09)	-0.18(0.16)	0.09(0.14)
Education (Ref: 0-5yrs primary) ^a								
Primary 6-8	0.34(0.23)	0.07(0.06)	0.12(0.06)*	0.02(0.07)	0.14(0.22)	-0.01(0.05)	0.15(0.08)	-0.002(0.07)
Sec school	0.47(0.25)	0.07(0.06)	0.004(0.07)	0.09(0.07)	0.18(0.22)	-0.04(0.05)	0.15(0.09)	0.20(0.08)*
post sec school	0.17(0.45)	0.08(0.11)	-0.03(0.12)	-0.003(0.13)	0.66(0.41)	0.03(0.09)	0.19(0.16)	-0.10(0.14)
Time to walk to HF (Ref: <30 mins) ^a								
30 – 60 mins	-0.23(0.23)	0.001(0.06)	-0.05(0.07)	-0.11(0.07)	-0.18(0.21)	0.01(0.05)	0.09(0.08)	-0.15(0.07)*
>60 mins	-0.51(0.23)*	-0.12(0.06)*	-0.09(0.06)	-0.19(0.07)**	-0.37(0.21)	0.05(0.05)	0.04(0.08)	-0.21(0.07)**
Disability (Ref: No) ^a								
Yes	0.06(0.29)	-0.09(0.07)	0.05(0.08)	-0.03(0.08)	-0.24(0.24)	0.03(0.06)	0.18(0.10)	-0.08(0.09)
Employment (Ref: Yes) ^a								
No	-0.14(0.21)	0.04(0.05)	0.14(0.06)*	-0.19(0.06)**	0.08(0.20)	0.04(0.04)	-0.03(0.07)	-0.14(0.07)*
Visits frequency in 2 years (Ref: 3 – 5) ^a								
> 5 times	0.16(0.19)	-0.09(0.05)	0.13(0.05)*	-0.16(0.06)**	-0.21(0.17)	0.02(0.04)	0.18(0.07)	0.07(0.06)

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416 **Author Contributions**

417 LD conceived, designed and carried out the study, the data analysis and drafting of the paper.

418 EM took part in the development of the study, the analysis, interpretation of data and critically

419 revised the paper. CK, SK, SG took part in the development of the study, supported

420 interpretation of the results and critically revised the paper. CK supervised the data collection.

421 ØH and TM critically revised the paper. All authors read and approved the final paper.

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426 the study and collection, analysis, and interpretation of data and in writing the manuscript.

427 **Competing interests**

428 The authors declare that they have no competing interests.

429 **Patient consent**

430 Not required.

431 **Ethics approval**

432 Ethical approval was provided by National Health Sciences Research Committee (NHSRC) of

433 Malawi (18/03/1993).

434 **Availability of data and materials**

The datasets use and/or analyzed during the current study are available from the corresponding author on reasonable request and are available on Open Science Framework at <https://osf.io/z2a8k>

REFERENCES:

1. Starfield B. Is primary care essential? The Lancet. 1994; 344(8930):1129-33.
2. Franks P, Fiscella K. Primary care physicians and specialists as personal physicians: health care expenditures and mortality experience. The Journal of Family Practice. 1998; 47:2, p105–109
3. Shi L, Starfield B. Primary care, income inequality, and self-rated health in the United States: a mixed-level analysis. International Journal of Health Services. 2000; 30:3, p541–555.
4. Shi L. The relationship between primary care and life chances. Journal of Health Care for the Poor and Underserved. 1992; 3: 2, p321–335
5. Starfield B, Shi L, Macinko J. Contribution of primary care to health systems and health. Milbank Quarterly. 2005; 83:3, p 457–502.
6. Rao M, Pilot E. The missing link--the role of primary care in global health. Global health action. 2014;7:23693.
7. Stigler FL, Macinko J, Pettigrew LM, Kumar R, van Weel C. No universal health coverage without primary health care. Lancet (London, England). 2016;387(10030):1811.
8. Segall M. District health systems in a neoliberal world: a review of five key policy areas. The International journal of health planning and management. 2003;18 Suppl 1:S5.

9. Kruk ME, Chukwuma A, Mbaruku G, Leslie HH. Variation in quality of primary care services in Kenya, Malawi, Namibia, Rwanda, Senegal, Uganda and the United Republic of Tanzania. *Bull World Health Organ.* 2017;95(6):408-18.
10. Shi L, Starfield B, Xu J, et al. Primary care quality: community health center and health maintenance organization. *South Med J.* 2003 Aug; 96(8):787-95.
11. Hu R, Liao Y, Du Z, Hao Y, Liang H, Shi L. Types of health care facilities and the quality of primary care: a study of characteristics and experiences of Chinese patients in Guangdong Province, China. *BMC Health Services Research.* 2016; 16:335. Available on :doi 10.1186/s12913-016-1604-2
12. Bresick G, Sayed A, le Grange C, Bhagwan S, Manga N, Hellenberg D. Western Cape Primary Care Assessment Tool (PCAT) study: Measuring primary care organization and performance in the Western Cape Province, South Africa (2013). *Afr J Prm Health Care Fam Med.* 2016;8(1), a1057. Available on:doi.org/10.4102/ phcfm.v8i1.1057
13. Government of Malawi: Ministry of Finance Economic Planning and Development. Malawi. Millennium Development Goals Report 2014. http://www.mw.undp.org/content/dam/malawi/docs/general/UNDP_MW_EDP_MDG_book_final.pdf (accessed on 28 April, 2018)
14. Abihiro G A, Mbera G B, De Allegri M. Gaps in universal health coverage in Malawi: A qualitative study in rural communities. *BMC Health Services Research* 2014 14:234. Available from <http://www.biomedcentral.com/1472-6963/14/234> (Accessed on 20 February, 2018)
15. Zere E, Moeti M, Kiringa J et al. Equity in health and healthcare in Malawi: analysis of trends. *BMC Public Health.* 2007; 7:78. Available from <http://www.biomedcentral.com/147-2458/7/78> (Accessed on 12 February, 2018)

16. Malawi Government Ministry of Health. Health Sector Strategic Plan II 2017 - 22: Lilongwe, 2017. Available on www.health.gov.mw/index.php/policies-strategies?download=47:hssp-ii-final (Accessed on 21 July, 2017)

17. von Elm E, Altman DG, Egger M, Pocock SJ, Gotsche PC, Vandenbroucke JP. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement: guidelines for reporting observational studies. *BMJ*. 2007 Oct 20;335(7624):806-8. DOI: 10.1136/bmj.39335.541782.AD

18. WHO. Health sector resource mapping: increasing access to information for decision making. World Health Organization, Geneva 2013. Available on http://www.who.int/pmnch/media/events/2013/resource_mapping.pdf (accessed on 20th January, 2018)

19. Dullie L, Meland E, Hetlevik Ø, Mildestvedt T, Gjesdal S. Development and validation of a Malawian version of the primary care assessment tool. *BMC Family Practice*. 2018; 19:63. Available on: doi.org/10.1186/s12875-018-0763-0

20. Shi L, Startfield B, Xu J. Validating the Adult Primary Care Assessment Tool. *J Fam Pract*. 2001 February; 50(2):161

21. Yang H, Shi L, Lebrun L et al. Development of the Chinese primary care assessment tool: data quality and measurement properties. *International Journal of Quality in Health Care*. 2013. 25:1, p. 92–105.

22. Lee J H, Choi Y H, Sung N J et al. Development of the Korean primary care assessment tool—measuring user experience: tests of data quality and measurement performance. *International Journal for Quality in Health Care*. 2009. 21:2, p. 103–111.

23. Aoki T, Inoue M, Nakayama T. Development and validation of the Japanese version of Primary Care Assessment Tool. *Family Practice*. 2016. 33:1, 112–117
doi:10.1093/fampra/cmz087
24. Bresick G, Sayed A, Le Grange C et al. Adaptation and Cross-cultural validation of the United States Primary Care Assessment Tool (expanded version) for use in South Africa. *African Journal of Primary Health Care and Family Medicine*. 2015;7(1), Available on: doi.org/10.4102/phcfm.v7i1.783
25. Macinko J, Almeida C, Klingelhofer de Sa P. A rapid assessment methodology for the evaluation of primary care organization and performance in Brazil. *Health Policy Plan*. 2007; 22:167–177. Available on: doi.org/10.1093/heapol/czm008
26. Wroe E B, Dunbar E L, Kalanga N, Dullie L, Kachimanga C, Mganga A et al. Delivering comprehensive HIV services across the HIV care continuum: a comparative analysis of survival and progress towards 90-90-90 in rural Malawi. *BMJ Glob Health* 2018;3:e000552. doi:10.1136/bmjgh-2017-000552
27. Mays GP, Smith SA. Evidence links increases in public health spending to declines in preventable deaths. *Health Affairs* 2011; 30(8): 1585–93
28. Bein MA, Unlucan D, Olowu G, Kalifa W. Healthcare spending and health outcomes: evidence from selected East African countries. *Afri Health Sci*. 2017;17(1): 247-254.
https://dx.doi.org/10.4314/ahs.v17i1.30
29. Makaula P, Bloch P, Banda H T, Bongololo G M, Mangani C, de Sousa A et al. Primary health care in rural Malawi - a qualitative assessment exploring the relevance of the community-directed interventions approach. *BMC Health Services Research* 2012, 2:328. Available on <http://www.biomedcentral.com/1472-6963/12/328>

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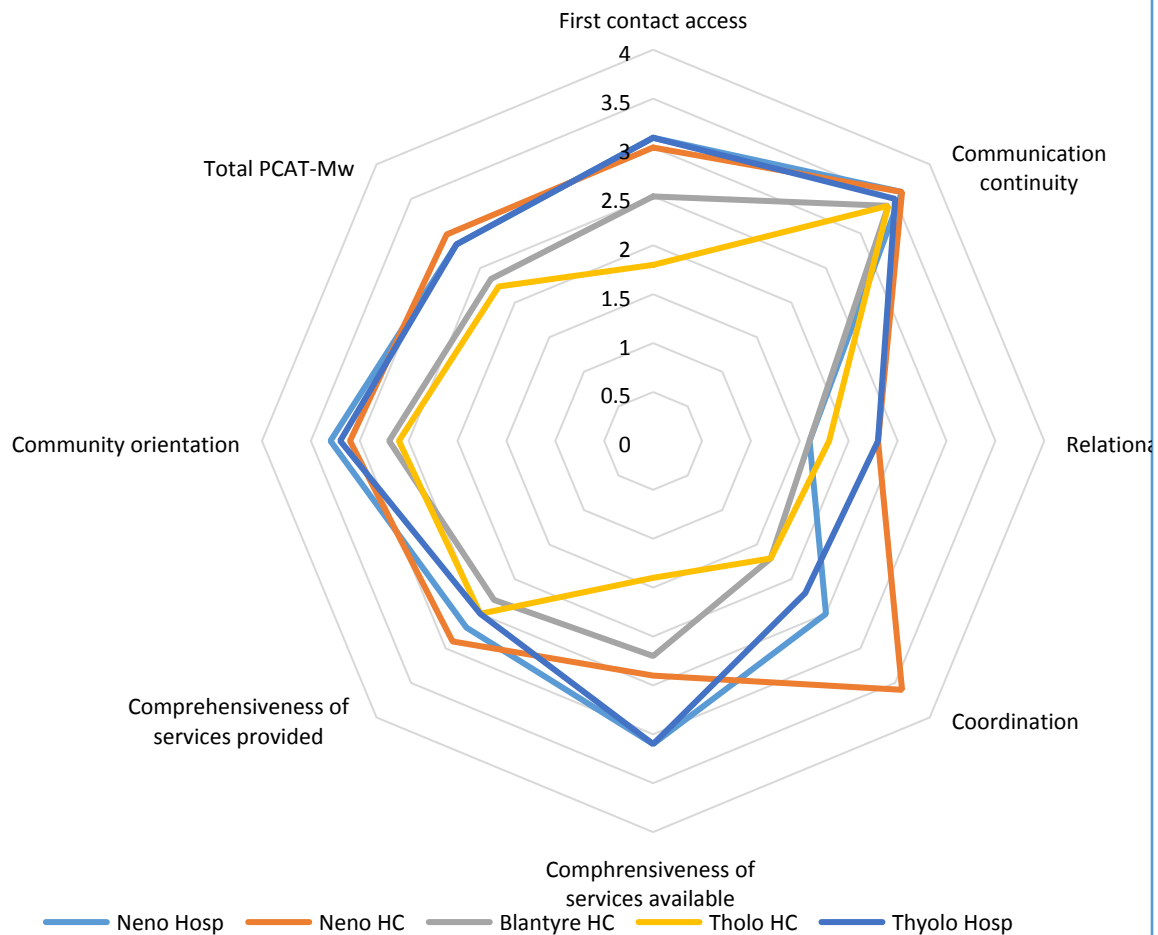
30. Kristjansson E, Hogg W, Dahrouge S, Tuna M, Mayo-Bruinsma L, Gebremichael G.
Predictors of relational continuity in primary care: patient, provider and practice factors.
BMC Fam Pract. 2013;14:72.

31. World Health Organization. Arguing for universal health coverage. Available on
http://www.who.int/health_financing/UHC_ENvs_BD.PDF. WHO, 2013. Geneva
(Accessed on 14 December, 2018).

32. Kringos D S, Boerma W G W, Hutchinson A, van der Zee J, Groenewegen P P. BMC
Health Serv Res. 2010; 10:65. <http://www.biomedcentral.com/1472-6963/10/65>

33. Hogg W, Rowan M, Russell G, Geneau R and Muldoon L. Framework for primary care
organizations: the importance of a structural domain. International Journal for Quality in
Health Care 2008; Volume 20, Number 5: pp. 308–313

Figure 1. Mean primary care attribute scores among patients attending outpatient clinics in South West health zone, Malawi, in July and August, 2018 shown by hospitals and health center clinics.



The Malawian version of the Primary care assessment tool (PCAT-Mw)

Dullie et al. BMC Family Practice (2018) 19:63 <https://doi.org/10.1186/s12875-018-0763-0>

First contact access (3 items)

1. When this HC is closed on Saturday and Sunday and you get sick, would someone from here see you the same day?
2. When the HC is closed and you get sick during the night, would someone from here see you that night?
3. Is there a complaints / suggestion box at this HC?

Communication continuity of care (4 items)

1. Is the staff friendly and approachable?
2. Do you think the staff at this HC understands what you say or ask?
3. Are your questions answered in a way that you understand?
4. Does this HC give you enough time to talk about your problems or worries?

Relational continuity of care (4 items)

1. Does this HC know you very well as a person, rather than as someone with a medical problem?
2. Does this HC know who lives with you?
3. Does this HC know your complete medical history?
4. Does this HC know about your work or employment?

Coordination (3 items) Lead questions confirm if patient has ever been referred in the previous six months

1. Does this HC know what the results of the visit were?
2. After you went to the specialist or hospital, did this HC talk with you about what happened at that visit?
3. Does this HC seem interested in the quality of care that you get from that specialist or hospital?

Comprehensiveness of services available (6 items)

1. Checking hearing
2. Dental check-up – checking and cleaning your teeth
3. Treatment by dental therapist eg extraction of bad teeth
4. Counseling for mental health problems
5. Plastering of fractures
6. Treatment of ingrown toe nails or removing part of a nail

Comprehensiveness of services provided (6 items)

1. Advice on wearing reflectors when walking on the road at night
2. How to prevent hot burns
3. Advice about appropriate exercise for you
4. Advice on how to prevent accidental falls
5. Ways to handle family conflict; arguments; disagreements (that may arise from time to time)
6. Possible exposure to harmful substances in your home, at work or in your area e.g. paraffin; pesticides?

Community orientation (3 items)

1. Do you think this HC knows about the important health problems of your area?
2. Does this HC get opinions and ideas from people or organizations with knowledge to help provide better health care? E.g. the local health committee, churches, other organizations?
3. Does this HC do surveys of patients to see if services are meeting the needs of the people?

Reporting checklist for cross sectional study.

Based on the STROBE cross sectional guidelines.

Instructions to authors

Complete this checklist by entering the page numbers from your manuscript where readers will find each of the items listed below.

Your article may not currently address all the items on the checklist. Please modify your text to include the missing information. If you are certain that an item does not apply, please write "n/a"

Upload your completed checklist as an extra file when you submit to a journal.

In your methods section, say that you used the STROBE cross sectional reporting guidelines, and cite them as:

von Elm E, Altman DG, Egger M, Pocock SJ, Gøtzsche PC, Vandenbroucke JP. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement: guidelines for reporting observational studies.

			Page
Reporting Item			Number
Title	#1a	Indicate the study's design with a commonly used term in the title or the abstract	1
Abstract	#1b	Provide in the abstract an informative and balanced summary of what was done and what was found	2 - 3

1	Background /	#2	Explain the scientific background and rationale for the	3 - 5
2				
3	rationale		investigation being reported	
4				
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6	Objectives	#3	State specific objectives, including any pre-specified	5
7			hypotheses	
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11	Study design	#4	Present key elements of study design early in the paper	5
12				
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15	Setting	#5	Describe the setting, locations, and relevant dates, including	5 - 6
16			periods of recruitment, exposure, follow-up, and data	
17			collection	
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22	Eligibility criteria	#6a	Give the eligibility criteria, and the sources and methods of	6
23			selection of participants.	
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28		#7	Clearly define all outcomes, exposures, predictors, potential	8
29			confounders, and effect modifiers. Give diagnostic criteria, if	
30			applicable	
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34				
35	Data sources /	#8	For each variable of interest give sources of data and details	7
36	measurement		of methods of assessment (measurement). Describe	
37			comparability of assessment methods if there is more than	
38			one group. Give information separately for for exposed and	
39			unexposed groups if applicable.	
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47	Bias	#9	Describe any efforts to address potential sources of bias	20
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51	Study size	#10	Explain how the study size was arrived at	6 - 7
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Quantitative variables	#11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen, and why	8 – 9
Statistical methods	#12a	Describe all statistical methods, including those used to control for confounding	8 - 9
	#12b	Describe any methods used to examine subgroups and interactions	8 - 9
	#12c	Explain how missing data were addressed	8
	#12d	If applicable, describe analytical methods taking account of sampling strategy	8 - 9
	#12e	Describe any sensitivity analyses	N/A
Participants	#13a	Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed. Give information separately for exposed and unexposed groups if applicable.	9
	#13b	Give reasons for non-participation at each stage	9
	#13c	Consider use of a flow diagram	N/A
Descriptive data	#14a	Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders. Give information separately for exposed and unexposed groups if applicable.	10

	#14b	Indicate number of participants with missing data for each variable of interest	9
Outcome data	#15	Report numbers of outcome events or summary measures. Give information separately for exposed and unexposed groups if applicable.	12 - 15
Main results	#16a	Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	N/A
	#16b	Report category boundaries when continuous variables were categorized	N/A
	#16c	If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	N/A
Other analyses	#17	Report other analyses done—e.g., analyses of subgroups and interactions, and sensitivity analyses	16
Key results	#18	Summarise key results with reference to study objectives	16 - 17
Limitations	#19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias.	20
Interpretation	#20	Give a cautious overall interpretation considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence.	17 - 19

Generalisability	#21	Discuss the generalisability (external validity) of the study results	21
Funding	#22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	24

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BMJ Open

Performance of primary care in different health care facilities: a cross sectional study of patients' experiences in Southern Malawi.

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Primary Subject Heading:	Health services research
Secondary Subject Heading:	Patient-centred medicine
Keywords:	PRIMARY CARE, primary care performance, primary care assessment tool, patient experience measurement, health services, Malawi.

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Performance of primary care in different health care facilities: a cross sectional study of patients’ experiences in Southern Malawi.

Authors:

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WORD COUNT: Abstract 293; Manuscript (excluding tables): 4088

ABSTRACT

Objective: In most African countries, primary care is delivered through a district health system. Many factors, including staffing levels, staff experience, availability of equipment and facility management, affect the quality of primary care between and within countries. The purpose of this study was to assess the quality of primary care in different types of public health facilities in Southern Malawi.

Study design: This was a cross sectional quantitative study.

Setting: The study was conducted in 12 public primary care facilities in Neno, Blantyre and Thyolo districts in July 2018.

Participants: Patients aged 18 years and above, excluding the severely ill, were selected to participate in the study.

Primary outcomes: We used the Malawian primary care assessment tool to conduct face-to-face interviews. ANOVA at 0.05 significance level was performed to compare primary care dimension means and total primary care scores. Linear regression models at 95% CI were used to assess associations between primary care dimension scores, patients' characteristics and healthcare setting.

Results: The final number of respondents was 962 representing 96.1% response rate. Patients in Neno hospitals scored 3.77 points higher than those in Thyolo health centers, and 2.87 higher than those in Blantyre health centers in total primary care performance. Primary care performance in health centers and in hospital clinics was similar in Neno (20.9 vs 19.0, $p=0.608$) while in Thyolo, it was higher at the hospital than at the health centers (19.9 vs 15.2, $p<0.001$). Urban and rural facilities showed a similar pattern of performance.

Conclusion: These results showed considerable variation in experiences among primary care users in the public health facilities in Malawi. Factors such as funding, policy and clinic level interventions influence patients’ reports of primary care performance. These factors should be further examined in longitudinal and experimental settings.

Key words: Primary care; primary care performance; primary care assessment tool; patient experience measurement; health services, Malawi.

ARTICLE SUMMARY

Strengths and limitations of the study

- This study is the first attempt in Malawi to measure the quality of primary care in different types of health facilities based on patients’ experiences.
- This study used a culturally adapted and locally validated measurement tool which has been widely used globally.
- There might have been potential for selection, response and recall bias as the data were collected from patients in a clinic setting; however, the face-to-face interviews provided opportunity for follow-up clarifying questions to minimize it.

BACKGROUND

Primary care is first contact, continuous, comprehensive, coordinated care that is provided to populations undifferentiated by gender, disease or organ system.¹ Strong evidence suggests that effective primary care is associated with improved equity and access to healthcare services, reduced hospitalizations and better cost effectiveness.²⁻⁵ Primary care is also considered as a vehicle for accelerating progress towards universal health coverage.^{6,7}

71 In most African countries, primary care is delivered through a district health system. At primary
72 level facilities, health care workers (HCWs) and community health workers (CHWs) provide
73 integrated preventive and curative services to a geographically defined population under the
74 supportive supervision of a district hospital and district health management team and with active
75 participation of the community.⁸

76 The quality of primary care between and within countries is affected by many factors. In a recent
77 study in several African countries, staffing levels, staff experience, availability of equipment and
78 facility management were some factors that accounted for variation in the quality of primary
79 care.⁹ In the US healthcare setting, it was found that health centers generally achieved higher
80 quality of primary care while primary care in hospitals was associated with less continuity.¹⁰
81 Similar results were found in a Chinese study which showed that community health centers
82 provided better quality primary care when compared with secondary and tertiary health care
83 facilities.¹¹ In a South African study, public rural and urban primary care users had similar
84 experiences of quality. This was attributed to standardized service packages and treatment
85 guidelines within the sector.¹²

86 Malawi has in the recent past registered notable progress particularly in HIV/AIDS and child
87 health indicators.¹³ However, significant persisting challenges include poor access to services,¹⁴
88 inequity and inadequate financial risk protection.^{15,16} The new 2017-2022 national health sector
89 strategic plan (HSSP II) seeks to achieve universal health coverage and improved patient
90 satisfaction.¹⁶ As no studies have been conducted in Malawi to compare patients' experience of
91 quality of primary care in the different settings of the public health sector, the results of this
92 study contribute to the HSSP II goals. The study is also a baseline of the experiences of patients

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93 with regard to the performance of primary care in the southern Malawi and thus provides a basis
94 for quality improvement in service delivery.

95 The purpose of this study was to assess the quality of primary care in different types of public
96 health facilities and to discuss implications of the findings in the context of using the district
97 health system model to achieve universal health coverage in the South West health zone in
98 Malawi. Study objectives were to compare primary care performance between districts, between
99 rural and urban health centers and between hospital clinics and health centers; and to assess the
100 association between primary care performance and characteristics of the primary care facilities.
101 The null hypothesis for the study was that there is no difference in performance of primary care
102 between the different types of health care facilities.

103 **MATERIALS AND METHODS**

104 **Study design**

105 This was an observational quantitative cross sectional study and we used the STROBE cross
106 sectional reporting guidelines¹⁷ to report the results.

107 **Sampling procedure**

108 The study was conducted in 12 facilities in three districts in the South-west health zone in July
109 and August 2018.

110 The South West health zone includes seven districts serving a population of about 3 million. Two
111 districts were purposefully selected: Neno because it receives the highest per capital funding in
112 Malawi¹⁸ and Blantyre because it has an urban population. The remaining five districts were
113 assigned numbers 1 – 5 by using the alphabetical order of their first letters. The third
114 participating district was selected by using a computer random number generator.

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2
3 115 The two hospitals in Neno and the district hospital in Thyolo were purposefully selected on the
4
5 116 basis of being the only public hospitals offering primary care within the study districts. All
6
7 117 public health centers in each district were assigned numbers in ascending order by using the
8
9 118 alphabetical order of their first letters. Participating health centers were selected by using a
10
11 119 computer random number generator so that each district had 4 study health facilities. The study
12
13 120 population included adult patients attending outpatient care in public health centers and hospitals
14
15 121 in the selected districts. Study participants were at least 18 years of age, must have used the
16
17 122 facility for at least six months and must have visited the facility for at least 3 times. Patients with
18
19 123 acute illness or with severe mental health disorders were excluded to allow them receive the
20
21 124 urgent care that they needed.

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25 125 There was no booking system for outpatients in the facilities where patients were seen. Patients
26
27 126 reported to the outpatient clinics directly and received services on first come first served basis.
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30 127 Each interviewer was expected to conduct 12 interviews per day based on prior experience with
31
32 128 the questionnaire. Potential subjects were identified through a pre-calculated interval which was
33
34 129 based on the expected duration of each interview and the number of waiting patients at the
35
36 130 beginning of each day. The interviewer approached the potential subject to administer the
37
38 131 screening questions and the written consent. If the potential subject did not consent, the next
39
40 132 potential subject was approached using the same procedure described above.
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45 133 **Sample size determination**

46
47 134 The sample size was calculated based on findings from a previous paper that compared PCAT
48
49 135 scores between patients in county, secondary and tertiary hospitals and rural health and
50
51 136 community health centers.¹¹ The minimum sample size of this study was estimated as 900 with a
52
53 137 95 % confidence interval and a power of 80 % and considering 2.5% incomplete or missing data.
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Measurement instrument and data collection

The primary care assessment set of tools (PCAT) are among the most widely used tools internationally in primary healthcare assessment.¹⁹ The PCAT aims at a global assessment of primary care organization and its performance in the core dimensions of accessibility, comprehensiveness, coordination and continuity, and accountability. The tool was originally developed by Starfield et al.²⁰ It has since been adapted and validated for use in numerous countries which allows for comparison of primary care performance in different settings.²¹⁻²⁵ We used the Malawian version of the primary care assessment tool (PCAT-Mw) whose validation was reported in another paper.²⁶ The PCAT-Mw is a multi-item multi-dimension questionnaire that measures primary care performance covering core dimensions of primary care (attached as supplementary file: validated PCAT-Mw items). The tool has 29 items measuring primary care performance in seven dimensions: first contact access (3 items), communication continuity of care (4 items), relational continuity of care (4 items), coordination (3 items), comprehensiveness of services available (6 items), comprehensiveness of services provided (6 items), and community orientation (3 items). First contact access is here defined as the manner in which services are organized to accommodate access whenever needed and ensure patient satisfaction. Continuity of care entails the existence of a regular source of care and the longitudinal relationship between primary care providers and patients, in terms of accommodation of patient's needs and preferences, such as communication and respect for patients. Coordination of care reflects the ability of primary care providers to facilitate and support patients to navigate use of other levels of health care when needed. Comprehensiveness of primary care services represents the range of services available in primary care to meet patients' health care needs. A distinction is made between services that are available and those

161 that are actually provided. Community orientation defines the extent to which the primary care
162 providers understand and address priority health problems in a particular community with
163 evidence of community participation.

164 Items are scored on a 4-point Likert scale, with 1 indicating “definitely not,” 2 indicating
165 “probably not,” 3 representing “probably,” and 4 representing “definitely.” Additionally, there
166 are questions to identify the usual primary care facility the patient uses and the patient’s
167 sociodemographic data.

168 Data collection was done through face-to-face interviewer administered questionnaire from
169 eligible patients in July 2018. Research assistants with prior interviewing experience received a 2
170 day refresher training before the start of data collection interviews.

171 **Conceptual framework of the study**

172 The study uses the Starfield primary care quality theoretical model²⁷ in which the primary care
173 system includes its organization, governance, available financial and human resources and its
174 information systems. The primary care dimensions form its process of care including
175 accessibility, continuity of care, coordination of care, comprehensiveness of services and
176 community orientation. The outcomes of primary care include improved health status, user
177 evaluation, health behavior change, equity, efficiency and safety. The interplay between the
178 primary care system and its process to bring about the desired outcomes is modified by
179 environmental and patient characteristics. In this study, the dimensions of primary care are used
180 as the process indicators for quality of primary care. Patients’ positive experience reflecting
181 acceptable performance in the dimensions of primary care is indicative of a high quality delivery
182 system.

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Study variables

Study outcome measures were mean scores of each primary care dimension and the total primary care score. Independent variables included sociodemographic characteristics: age, sex, education, employment status of the patient and or the head of the household, patient’s disability status; healthcare measures: acute or chronic presentation, duration of contact with facility, estimated time taken to get to the facility, frequency of visits in the past 2 years, satisfaction with care and self-rated health status (SRH). Data were also collected on district characteristics such as location (rural/urban), catchment population, number of healthcare workers, number of community healthcare workers and estimated per capita health funding.

Data entry and Statistical analysis

Data analysis was done using the IBM SPSS Statistics 25.0.0 (2017) package. For consistency with methods used in PCAT studies in other countries, a mid-scale value of 2.5 was assigned to “not sure” answers while the mean item score was used for missing data.^{21,22,25,28}

First, chi-square analyses were applied to compare socio-demographic, healthcare and health characteristics of patients in the different types of facilities. Primary care dimension mean scores were derived by dividing the sum of the item means by the number of items in the dimension. A score ≥ 3 was considered ‘acceptable to good performance’ and < 3 as ‘poor performance’.^{12, 29}

Total primary care was calculated as the sum of all dimension mean scores. Next, independent sample T-tests and ANOVA were performed to compare performance of primary care dimensions in different types of health care facilities. Multiple linear regression models were then used to assess the association between types of facility and performance of primary care dimensions after controlling for patients’ socio-demographic, healthcare, and health characteristics.

206 Patient and public involvement.

207 We did not involve patients and the public in the design of the study.

208 Ethical approval and consent to participate

209 Ethical approval for the study was granted by the Malawi National Health Sciences Research
210 Committee (NHSRC): 18/03/1993.

211 District Health Officers also gave permission for the study in their respective districts. Study
212 participants provided written consent.

213 RESULTS

214 This paper presents results from 962 completed questionnaires out of 1001 potential respondents
215 that were approached representing 96.1% response rate. Those that declined cited lack of time to
216 participate. Missing data accounted for approximately 1.2 % of all data.

217 District characteristics

218 Table 1 shows that Neno had the highest density of both primary HCWs and CHWs followed by
219 Blantyre for HCWs and Thyolo for CHWs respectively. With regards to funding, Neno received
220 about 3 times as much total per capita healthcare funding as Thyolo and Blantyre respectively
221 during 2017 – 2018 financial year.

Table 1: Structural and organizational characteristics of primary care facilities in South West health zone, Malawi in July - August 2018

Facility	Type of facility	Location	Catchment population	Number of HCWs ^a (per 1000 pop)	Number of CHWs ^b (per 1000 pop)	District per capita health funding in US\$ per year
Neno						
1	Hospital	Rural	20 711	9 (0.4)	143 (6.9)	60
2	Hospital	Rural	11 284	4 (0.4)	112 (9.9)	
3	Health center	Rural	14 433	3 (0.2)	98 (6.8)	
4	Health center	Rural	8 936	4 (0.4)	58 (6.5)	
Thyolo						
5	Hospital	Rural	51 318	21 (0.4)	24 (0.5)	22
6	Health center	Rural	19 444	1 (0.1)	14 (0.7)	
7	Health center	Rural	47 092	8 (0.2)	29 (0.6)	
8	Health center	Rural	52 782	7 (0.1)	22 (0.4)	
Blantyre						
9	Health center	Urban	78 561	25 (0.3)	37 (0.5)	18
10	Health center	Urban	79 675	33 (0.4)	41 (0.5)	
11	Health center	Urban	135 726	31 (0.2)	44 (0.3)	
12	Health center	Urban	145 821	23 (0.2)	46 (0.3)	

^a: Healthcare workers (CHWs) comprised nurses/nurse-midwives/medical assistants/clinical officers
^b: Community health workers (CHWs) comprised health surveillance assistants and community health volunteers on stipend

Demographic and healthcare characteristics of participants

Table 2 compares the distribution of patient characteristics for the five types of health care settings. Sixty-four percent of primary care visits were from females and over 80% of patients were between 18 and 45 years of age. Among rural patients, 81% were affiliated to their primary care facilities for longer than 4 years compared to 55% among urban patients. Fifteen percent of respondents in Blantyre had 5 years or less of education compared to 37% among Thyolo health centers respondents and 45% in Neno health centers. About 60% of patients in Neno walked for more than 1 hour to their facility compared to 48% in Thyolo and 17% in Blantyre.

Table 2 Demographic, socioeconomic, and health measures of the patients attending clinics in South West health zone, Malawi, in July and August, 2018 shown by type of facility

Characteristic	Total (N=962) (%)	Neno hospitals (n = 151) (%)	Neno health centers (n = 152) (%)	Thyolo hospital (n = 132) (%)	Thyolo health centers (n = 226) (%)	Blantyre Urban health centers (n = 301) (%)
Sex						
Female	616 (64.0)	89 (58.9)	107 (70.4)	78 (59.1)	145 (64.2)	197 (65.4)
Male	346 (36.0)	62 (41.1)	45 (29.6)	54 (40.9)	81 (35.8)	104 (34.6)
Age**						
18- 30 years	448 (46.6)	70 (46.4)	79 (52.0)	35 (26.5)	99 (43.8)	165 (54.8)
31 - 45 years	342 (35.6)	56 (37.1)	46 (30.3)	63 (47.7)	70 (31.0)	107 (35.5)
46 - 60 years	128 (13.2)	16 (10.6)	18 (11.8)	25 (19.9)	45 (19.9)	24 (8.0)
Above 60	44 (4.6)	9 (6.0)	9 (5.9)	9 (6.8)	12 (5.3)	5 (1.7)
Education**						
None	108 (11.2)	34 (22.5)	28 (18.4)	17 (12.9)	20 (8.8)	9 (3.0)
Up to 5 years primary	206 (21.4)	29 (19.2)	40 (26.3)	37 (28.0)	64 (28.3)	36 (12.0)
5 - 8 years primary	302 (31.4)	38 (25.2)	59 (38.8)	40 (30.3)	88 (38.9)	77 (25.6)
At least secondary	296 (36.0)	50 (33.1)	25 (16.5)	38 (28.8)	41 (23.9)	179 (59.4)
Employment status**						
Part-time or full time	273 (28.4)	30 (19.9)	46 (30.3)	35 (26.5)	54 (23.9)	108 (35.9)
Self employed	395 (41.1)	53 (35.1)	84 (55.3)	75 (56.8)	103 (45.6)	80 (25.6)
Home maker	293 (30.5)	68 (45.0)	22 (14.6)	22 (16.6)	69 (20.5)	113 (37.5)
Duration of facility affiliation**						
6months to 2 years	153 (15.9)	10 (6.6)	16 (10.5)	15 (11.4)	23 (10.2)	89 (29.6)
2 - 4 years	107 (11.0)	14 (9.3)	7 (4.6)	15 (11.4)	26 (11.5)	45 (15.0)
>4 years	702 (73.0)	127 (84.1)	129 (84.9)	102 (77.2)	177 (78.2)	167 (55.4)
Number of clinic visits in 2 years**						
3 - 5	413 (42.9)	49 (32.5)	60 (39.5)	60 (45.5)	78 (34.5)	166 (55.1)
>5	549 (57.1)	102 (67.5)	92 (60.5)	72 (54.5)	148 (65.5)	135 (44.9)
Time to travel to facility**						
<30 mins	316 (32.8)	31 (20.5)	35 (23.0)	34 (25.8)	71 (31.4)	145 (48.2)
30 - 60mins	247 (25.7)	26 (17.2)	29 (19.1)	24 (18.2)	62 (27.4)	106 (35.1)
>60mins	399 (41.5)	94 (62.3)	88 (57.9)	74 (56.0)	93 (41.2)	50 (16.7)
Disability (physical, mental)**						
No	850 (88.4)	143 (94.7)	130 (85.5)	94 (71.2)	217 (96.0)	266 (88.4)
Yes	112 (11.6)	8 (5.3)	22 (14.5)	38 (28.8)	9 (4.0)	35 (11.6)
Self-rated health**						
Poor (VP/P/F)	466 (48.4)	57 (37.7)	62 (40.8)	63 (47.7)	125 (55.3)	176 (58.5)
Good (G/VG)	496 (51.6)	94 (62.3)	90 (59.2)	69 (52.3)	101 (44.7)	125 (41.5)
Patient satisfaction**						
Poor (VP/P/F)	475 (49.4)	58 (38.4)	61 (40.1)	70 (53.0)	128 (56.6)	158 (52.3)
Good (G/VG)	487 (50.6)	93 (61.6)	91 (59.9)	62 (47.0)	98 (43.4)	143 (47.7)

*P<.05. **p<.01, based on Chi-square test of difference across healthcare settings

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Primary care performance by district

Table 3 compares primary care performance at the district level through total PCAT-Mw and individual dimension mean scores. Patients in Neno reported a significantly higher total primary care performance at 20.3 (n = 303, 95% CI 20.0, 20.6) compared to both Thyolo and Blantyre at 16.8 (n = 358, 95% CI 16.4, 17.2) and 16.4 (n = 301, 95% CI 16.1, 16.7) respectively (p = <0.01). This same difference was found in all but one (relational continuity) of the primary care dimensions measured. In Neno, acceptable performance was reported in first contact access (3.1), communication continuity (3.6), coordination (3.1) and community orientation (3.2). Poor performance was reported in relational continuity (1.9), comprehensiveness of services available and provided, at 2.7 each.

There was no significant difference between Thyolo and Blantyre with regard to total primary care performance. Patients in Thyolo reported significantly higher scores relative to patients in Blantyre in relational continuity (2.0 vs 1.6, p<0.01) and comprehensiveness of services provided (2.5 vs 2.3, p<0.05) but patients from Blantyre reported higher scores in first contact access (2.5 vs 2.3, p<0.05) and comprehensiveness of services available (2.2 vs 2.0, p<0.05). Both Blantyre and Thyolo had acceptable performance score (3.4) in communication continuity. Poor performance was reported in other primary care dimensions in both districts. The lowest scores were reported in coordination (1.8 and 1.7).

Table 3: Primary care dimension mean scores in South West health zone, Malawi, in July and August, 2018 shown by district.

Characteristic	Total (95%CI)	Neno (95%CI)	Thyolo (95%CI)	Blantyre (95%CI)
Sample size	962	303	358	301
First contact – access	2.6 (2.5, 2.7)	3.1 (3.0, 3.2)**	2.3 (2.2, 2.4)**#	2.5 (2.4, 2.6)**#
Communication continuity	3.4 (3.3, 3.5)	3.6 (3.5, 3.7)*	3.4 (3.3, 3.5)*	3.4 (3.3, 3.5)*
Relational Continuity	1.8 (1.7, 1.9)	1.9 (1.8, 2.0)**	2.0 (1.9, 2.1)##	1.6 (1.5, 1.7)**##
Coordination	2.0 (1.8, 2.2)	3.1 (2.8, 3.4)**	1.8 (1.5, 2.1)**	1.7 (1.5, 1.9)**
Comprehensiveness				
Services available	2.3 (2.2, 2.4)	2.7 (2.6, 2.8)**	2.0 (1.9, 2.1)**#	2.2 (2.1, 2.3)**#
Services provided	2.5 (2.4, 2.6)	2.7 (2.6, 2.8)**	2.5 (2.4, 2.6)**#	2.3 (2.2, 2.4)**#
Community orientation	2.9 (2.8, 3.0)	3.2 (3.1, 3.3)**	2.8 (2.7, 2.9)**	2.7 (2.6, 2.8)**
Total PCAT-Mw score	17.5(17.3, 17.7)	20.3 (20.0, 20.6)**	16.8 (16.4, 17.2)**	16.4 (16.1, 16.7)**

Based on ANOVA Bonferroni post-hoc means test:

*P<0.05, **P<0.01 comparing Neno and Thyolo and Blantyre;

P < 0.05, ## P<0.01 comparing Thyolo and Blantyre

Primary care performance in rural and urban facilities

Table 4 shows the bivariate results comparing primary care dimension scores in health centers to highlight differences between urban and rural settings. Patients in Neno reported a significantly higher total primary care performance at 20.9 (n = 152, 95% CI 20.4, 21.4) compared to both Thyolo and Blantyre at 16.8 (n = 226, 95% CI 14.8, 15.6) and 16.4 (n = 301, 95% CI 16.1, 16.7) respectively (p = <0.01). Neno health centers also reported better performance in all of the primary care dimensions. In Neno, acceptable performance was reported in first contact access (3.0), communication continuity (3.6), coordination (3.6) and community orientation (3.1). Poor performance was reported in relational continuity (2.3), comprehensiveness of services available

(2.4) and comprehensiveness of services provided at 2.9. Blantyre and Thyolo health centers reported acceptable performance only in communication continuity (3.4). Both districts reported poor performance in the other dimensions and coordination was lowest (1.7).

Table 4: Primary care dimension mean scores in South West health zone, Malawi, in July and August, 2018 comparing rural and urban health facilities.

Characteristic	Total (95%CI)	Neno Health centers (Rural) (95%CI)	Thyolo health centers(Rural) (95%CI)	Blantyre Urban Health centers (95%CI)
Sample size	962	152	226	301
First contact – access	2.6 (2.4, 2.7)	3.0 (2.9, 3.1)**	1.8 (1.7, 1.9)***	2.5 (2.4, 2.6)***
Communication continuity	3.4 (3.3, 3.5)	3.6 (3.5, 3.7)	3.4(3.3, 3.5)	3.4 (3.3, 3.5)
Relational Continuity	1.8 (1.7, 1.9)	2.3(2.1, 2.5)**	1.8(1.7, 1.9)**	1.6 (1.5, 1.6)**
Coordination	2.0 (1.8, 2.2)	3.6(3.3, 3.9)**	1.7(1.4, 2.0)**	1.7 (1.5, 1.9)**
Comprehensiveness				
Services available	2.3 (2.2, 2.4)	2.4(2.3, 2.5)**	1.4(1.3, 1.5)***	2.2 (2.1, 2.3)***
Services provided	2.5 (2.4, 2.6)	2.9(2.8, 3.0)**	2.5(2.4, 2.6)**	2.3 (2.2, 2.4)**
Community orientation	2.9 (2.8, 3.0)	3.1(3.0, 3.2)**	2.6(2.4, 2.7)**	2.7 (2.6, 2.8)**
Total PCAT-Mw score	17.5 (17.3, 17.7)	20.9 (20.4, 21.4)**	15.2 (14.8, 15.6)***	16.4 (16.1, 16.7)***

Based on ANOVA Bonferroni post-hoc means test:
*P<0.05, **P<0.01 comparing Neno and Thyolo and Blantyre;
P < 0.05, ## P<0.01 comparing Thyolo and Blantyre

Primary care dimension scores in hospital and health center clinics

Table 5 shows results of primary care dimension scores compared between hospitals and health center clinics. Because of the performance differences between the districts as noted above, Neno and Thyolo are compared separately. There is no public hospital in Blantyre. Health centers and hospitals performed equally well in both districts in communication continuity and equally poorly in comprehensiveness of services provided. Hospitals performed

299 better than health centers in both districts in community orientation and comprehensiveness of
 300 services available. Thyolo hospital also performed better in first contact access, relational
 301 continuity, coordination and total PCAT-Mw scores than health centers. Coordination and
 302 relational continuity were reported better in health centers than hospitals in Neno. The only
 303 difference between Neno and Thyolo hospitals was a better relational continuity in Thyolo.

304 Table 5: Mean primary care dimension mean scores among patients attending outpatient clinics in South
 305 West health zone, Malawi, in July and August, 2018 shown by hospital and health center clinics.

Characteristic	Neno hospitals (SE)	Neno Health centers (SE)	P value	Thyolo hospital (SE)	Thyolo health centers (SE)	P value
Sample size	151	152		132	226	
First contact – access	3.1(0.05)	3.0 (0.05)	0.308	3.1(0.07)	1.8 (0.05)	<0.001**
Communication continuity	3.6(0.05)	3.6 (0.05)	0.816	3.5(0.07)	3.4(0.06)	0.371
Relational Continuity	1.6(0.06)#	2.3(0.08)	<0.001**	2.3(0.08)#	1.8(0.06)	<0.001**
Coordination	2.5(0.27)	3.6(0.17)	0.001*	2.2(0.27)	1.7(0.17)	<0.001**
Comprehensiveness						
Services available	3.1(0.05)	2.4(0.05)	<0.001**	3.1(0.06)	1.4(0.04)	<0.001**
Services provided	2.7(0.08)	2.9(0.07)	0.085	2.5(0.06)	2.5(0.07)	0.753
Community orientation	3.3(0.07)	3.1(0.06)	0.025*	3.2(0.08)	2.6(0.06)	<0.001**
Total PCAT-Mw score	19.0 (0.18)	20.9 (0.25)	0.608	19.9 (0.31)	15.2 (0.20)	<0.001**

Based on ANOVA Bonferroni post-hoc means test

*P<0.05. **P<0.01 comparing hospitals and health centers;

P < 0.05 when Neno and Thyolo hospitals compared.

310 Figure 1 is a radar chart showing dimension performance according to the different settings. The
 311 figure shows that the differences between the contexts were most evident in first contact access,
 312 coordination comprehensiveness of services available. Neno health centers performed better than
 313 the other facilities in coordination

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Legend: (Figure 1. Mean primary care attribute scores among patients attending outpatient clinics in South West health zone, Malawi, in July and August, 2018 shown by hospitals and health center clinics)

Multivariate analyses of primary care dimension mean scores

Table 6 presents the results of the multivariable linear regression analyses used to assess the association between facility characteristics and primary care total and dimension performance mean scores after controlling for patients’ sociodemographic and healthcare and health characteristics.

Using Neno hospitals as the reference, the coefficient for Thyolo health centers was -3.77 , and -2.87 for the health centers in Blantyre in total primary care. Thus, patients in Neno hospitals would have on average an estimated 3.77 points greater score than those in Thyolo health centers, and 2.87 greater score than those in Blantyre health centers. The variables studied explained 30% of the variances observed with regard to total primary care scores.

With respect to dimensions, similar results were seen in coordination of care, first contact access and comprehensiveness of services available. In these dimensions, the studied variables explained 22.4%, 37.7%, 54.4% of the variances observed.

DISCUSSION

This study assessed the performance of primary care as experienced and reported by patients in different types of public health facilities in three districts in the South West health zone in Malawi. We used an internationally recognized and locally validated tool, PCAT. When performance was compared among the three districts, Neno achieved a significantly higher total primary care score than Blantyre and Thyolo respectively. Patients in Neno also reported

336 acceptable scores in first contact access, communication continuity of care, coordination and
337 community orientation compared to good performance in only one dimension (communication
338 continuity of care) in Thyolo and Blantyre.

339 These results can partly be explained by the significantly higher per capita health funding that
340 Neno currently receives compared to the other districts. Similar conclusions were made when
341 Neno was compared to other districts in program performance outcomes in maternal and child
342 health¹⁸ and HIV care indicators³⁰ in previous studies.

343 Another related possible explanation is the low HCW: patient- and CHW: patient ratios observed
344 in Neno. Staffing levels were among factors that were identified to have affected quality of
345 primary care in a study in several African countries including Malawi.⁹ Achieving Malawi's
346 HSSP II goals of better health outcomes and patient satisfaction will therefore require more
347 investment to increase healthcare spending above the national average of 40 US\$ per capita
348 which is the lowest in the SADC region¹⁶ since it is known that increase in public healthcare
349 spending has a long-lasting impact in low-resource communities³¹ and is associated with better
350 health outcomes.³²

351 Performance of primary care in health centers was compared to highlight differences between
352 urban and rural settings. The better performance reported in Neno health centers is probably due
353 to the same factors as described in the paragraphs above. Blantyre and Thyolo districts had
354 similar per capita funding and HCW: patient and CHW: patient ratio. The pattern of performance
355 is also similar across all primary care dimensions although differences in scores among
356 individual dimensions resulted in higher total primary care in the urban facilities. The similar
357 pattern of performance is likely because of the just noted similarities in their primary care inputs.
358 In addition to having similar available resources, standardized protocols and clinical guidelines

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are used by the HCWs who provide primary care and would have received similar training.

Results of a South African study on organization and performance of primary care in the Cape Town region, where standardized protocols were used, also did not show a significant difference in experiences of patients from rural and urban settings.¹² This probably implies that equitable distribution of resources is more important than the setting per se in the quality of services that patients experience.

We also compared primary care experiences among patients attending health center and hospital clinics. This was done by using facilities in Neno and Thyolo. Health centers play an important gate-keeping role that is essential to well-functioning health systems. In this study, health centers from Thyolo scored lower than the hospital clinic in total primary care and all of the individual dimensions except communication continuity of care. In most districts, the peripheral facilities face more acute challenges than the district hospital. A qualitative assessment of PHC in Malawi found that some of the challenges that peripheral facilities experienced were inadequacy of supplies, shortage of personnel, poor quality of infrastructures and unavailable transport and communication equipment.³³ The same study also found that health partners preferred district level to health center level implementation thereby exacerbating uneven distribution of resources. The poor performance in health centers may also be a result of people's lack of trust in primary care providers and their services.

In Neno, total primary care was similar at the hospitals and health centers. There were however differences in performances between the two levels among the individual dimensions with health centers doing better in relational continuity and coordination of care. Smaller facilities tend to favor relational continuity and coordination of care.³⁴ Funding and staffing levels are likely not the only factors that impact on patients' reporting of primary care performance. Further

prospective studies could explore the reasons for the similarities in primary care performance between the hospital clinics (Neno and Thyolo) and health centers in Neno.

The differences in primary performance reported by patients from different types of health facilities held true in this study irrespective of the patients' socio-demographic and healthcare characteristics. Among the primary care dimensions, first contact access and comprehensiveness of services available contributed more to the observed variation. The factors that were assessed explained 37.7% and 54.4% of the variances in first contact access and comprehensiveness of services available respectively. This is a suggestion of some order of importance among the dimensions at least as shown in this study. Utilization, coordination and continuity of services can only effectively take place when people have access to the services that they need. WHO states in its report on universal health coverage that the first objective is that everybody should be able to access a full-range of quality health services.³⁵ A systematic review of the literature on the dimensions of primary care by Kringos et al concludes that a hierarchy of importance could be observed. The hierarchy consisted of access to primary care services, the comprehensiveness of services available and provided, continuity, and coordination of care.³⁶ The improvement of access to services that people need is therefore a reasonable step towards improving quality of primary care.

Access and comprehensiveness of services largely depend on the facility infrastructure, availability of medical supplies, adequate supply of appropriately trained primary health care workers (including community health workers). On the other hand, continuity of care, coordination and community orientation depend on the local clinic operations.³⁷ Improving primary care in Malawi will therefore require both policy and clinic level interventions. The results of this study also showed that there was no significant difference in communication

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continuity across the different types of facilities. This dimension also performed well across all facilities. A possible explanation for this might be the similar preservice training that primary care providers receive regarding patient-provider communication. Further studies could explore the role of preservice training interventions in affecting the quality of primary care delivered.

The strength of this study lies in the use of a culturally adapted and locally validated tool which has been used widely globally to assess performance of primary care from patients' perspective in many different settings. Additionally, it is the first time that this kind of study has been undertaken in the 3 districts. The results of this study therefore provide insight into patients' perspective of primary care performance thereby complimenting clinical health outcome measures in evaluating quality of health services.

The study had a number of limitations. First there is potential for bias in the data. Recall bias could occur as the patients were asked to provide information not only from current but also from historical experience. The face-to-face interview partly minimized recall bias through clarifying questions whenever that was necessary. Potential for response bias was possible because data collection was done onsite during a clinic visit. Selection bias might have resulted from excluding those who were acutely ill, frail or had severe mental illness and interviewing only patients who attended clinics. Secondly, a cross-sectional study is an efficient way of obtaining a large sample. However, it is not possible to make causal inferences from the analysis. Thirdly, this was a study of patient experiences of primary care and not of disease specific clinical outcomes. Further studies could assess correlations between clinical outcomes and patient experiences of care and the extent to which patient experiences predict later health outcomes. Fourth, there could be unmeasured confounding factors that might affect patients' experience of primary care other than those studied.

CONCLUSION

Despite these limitations, the findings of this study are helpful in providing insight in the performance of primary care in different types of public facilities in Malawi. This paper showed that there is considerable variation in experiences among primary care users in the public health facilities in Malawi. Factors such as funding, policy and clinic level interventions influence patients' reports of primary care performance. These factors should be further examined in longitudinal and experimental settings.

ABBREVIATIONS

ANOVA	Analysis of Variance
CHW	Community Health Worker
HCW	Health Care Worker
HSSP	Health Sector Strategic Plan
NGO	Non-Governmental Organization
NHSRC	National Health Sciences Research Committee
PCAT	Primacy Care Assessment Tool
PCAT - Mw	Primary Care Assessment Tool – Malawian version
PIH	Partners In Health
SADC	Southern Africa Development Community
WHO	World Health Organization

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Table 6: Linear regression models assessing association between sociodemographic, healthcare, health factors, primary care dimension mean scores and types of health facilities with unstandardized beta values among 962 patients attending outpatient clinics in South West zone, Malawi in July – August, 2018

	Total Primary care	First contact access	Communication continuity	Continuity Relational	Coordination	Services Available	Services Provided	Community Orientation
	B (SE)	B (SE)	B (SE)	B (SE)	B (SE)	B (SE)	B (SE)	B (SE)
Reference	17.12(0.55)	3.10(0.14)	3.47(0.15)	1.77(0.16)	2.96(0.51)	3.05(0.11)	2.39(0.19)	3.37(0.17)
Sex (Ref: M) ^a								
Female	-0.29(0.20)	0.04(0.05)	-0.09(0.05)	-0.11(0.06)*	0.25(0.21)	-0.09(0.04)*	-0.08(0.07)	0.03(0.06)
Age(Ref: 18 – 30 yrs) ^a								
30 – 45yrs	-0.24(0.21)	0.08(0.05)	-0.15(0.06)**	0.02(0.06)	-0.14(0.18)	-0.01(0.04)	-0.13(0.07)	-0.05(0.07)
45 – 60yrs	-0.35(0.30)	-0.01(0.07)	-0.31(0.08)**	0.09(0.09)	0.10(0.28)	0.05(0.06)	-0.12(0.10)	-0.05(0.09)
>60yrs	0.07(0.45)	0.09(0.11)	-0.04(0.12)	0.13(0.13)	-0.46(0.47)	-0.01(0.09)	-0.18(0.16)	0.09(0.14)
Education (Ref: 0-5yrs primary) ^a								
Primary 6-8	0.34(0.23)	0.07(0.06)	0.12(0.06)*	0.02(0.07)	0.14(0.22)	-0.01(0.05)	0.15(0.08)	-0.002(0.07)
Sec school	0.47(0.25)	0.07(0.06)	0.004(0.07)	0.09(0.07)	0.18(0.22)	-0.04(0.05)	0.15(0.09)	0.20(0.08)*
post sec school	0.17(0.45)	0.08(0.11)	-0.03(0.12)	-0.003(0.13)	0.66(0.41)	0.03(0.09)	0.19(0.16)	-0.10(0.14)
Time to walk to HF (Ref: <30 mins) ^a								
30 – 60 mins	-0.23(0.23)	0.001(0.06)	-0.05(0.07)	-0.11(0.07)	-0.18(0.21)	0.01(0.05)	0.09(0.08)	-0.15(0.07)*
>60 mins	-0.51(0.23)*	-0.12(0.06)*	-0.09(0.06)	-0.19(0.07)**	-0.37(0.21)	0.05(0.05)	0.04(0.08)	-0.21(0.07)**
Disability (Ref: No) ^a								
Yes	0.06(0.29)	-0.09(0.07)	0.05(0.08)	-0.03(0.08)	-0.24(0.24)	0.03(0.06)	0.18(0.10)	-0.08(0.09)
Employment (Ref: Yes) ^a								
No	-0.14(0.21)	0.04(0.05)	0.14(0.06)*	-0.19(0.06)**	0.08(0.20)	0.04(0.04)	-0.03(0.07)	-0.14(0.07)*
Visits frequency in 2 years (Ref:3 – 5) ^a								
> 5 times	0.16(0.19)	-0.09(0.05)	0.13(0.05)*	-0.16(0.06)**	-0.21(0.17)	0.02(0.04)	0.18(0.07)	0.07(0.06)

Self-rated health (Ref: VP/P/F) ^a								
G/VG	0.43(0.19)*	0.05(0.05)	0.05(0.05)	0.10(0.06)	0.08(0.17)	0.06(0.04)	0.09(0.07)	0.18(0.06)**
Satisfaction (Ref: VP/P/F) ^a								
G/VG	1.41(0.19)**	0.07(0.05)	0.37(0.05)**	0.24(0.06)**	0.35(0.17)*	0.17(0.04)**	0.18(0.07)	0.39(0.06)**
Yrs affiliated with HF(Ref: 6mon – 2yrs) ^a								
2 –4 years	-0.14(0.36)	-0.01(0.09)	-0.08(0.10)	0.04(0.10)	-0.61(0.39)	-0.03(0.07)	-0.02(0.12)	-0.05(0.11)
> 4 years	-0.19(0.26)	0.02(0.07)	-0.11(0.07)	0.03(0.08)	-0.33(0.24)	-0.11(0.05)*	0.02(0.09)	-0.04(0.08)
Type of Health Facility(Ref: Neno hosp)b								
Neno HCs	-0.11(0.33)	-0.07(0.08)	0.02(0.09)	0.66(0.10)**	1.03(0.35)**	-0.68(0.07)**	0.20(0.12)	-0.25(0.10)
Thyolo HCs	3.77(0.30)**	-1.35(0.07)**	-0.12(0.08)	0.22(0.09)*	-0.89(0.32)**	-1.64(0.06)**	-0.18(0.11)*	-0.70(0.09)**
Thylo hospital	0.36(0.35)	-0.03(0.09)	-0.03(0.09)	0.68(0.10)**	-0.37(0.36)	0.04(0.07)	-0.18(0.12)	-0.11(0.11)**
Blantyre HCs	2.87(0.31)**	-0.69(0.08)**	-0.17(0.08)*	-0.04(0.09)	-1.10(0.31)**	-0.83(0.06)**	-0.45(0.11)**	-0.70(0.10)**
R ²	30.0%	37.7%	9.0%	15.7%	22.4%	54.4%	5.7%	14.6%

^a- unadjusted linear regression models

^b- linear regression models adjusted for sociodemographic, healthcare and health characteristics of patients

*p = <0.05

**p = < 0.01

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Author Contributions

LD conceived, designed and carried out the study, the data analysis and drafting of the paper.

EM took part in the development of the study, the analysis, interpretation of data and critically revised the paper. CK, SK, SG took part in the development of the study, supported interpretation of the results and critically revised the paper. CK supervised the data collection.

ØH and TM critically revised the paper. All authors read and approved the final paper.

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Competing interests

The authors declare that they have no competing interests.

Patient consent

Patients provided written consent.

Ethics approval

Ethical approval was provided by National Health Sciences Research Committee (NHSRC) of Malawi (18/03/1993).

460 Availability of data and materials

461 Extra data can be accessed via the Dryad data repository at <http://datadryad.org/> with the doi:
462 10.5061/dryad.cp388tm

464 Data files: Primary care in different facilities_pcat3final data file_spss_SAV_270718.

465 REFERENCES:

- 466 1. Starfield B. Is primary care essential? *The Lancet*. 1994; 344(8930):1129-33.
- 467 2. Franks P, Fiscella K. Primary care physicians and specialists as personal physicians:
468 health care expenditures and mortality experience. *The Journal of Family Practice*. 1998;
469 47:2, p105–109
- 470 3. Shi L, Starfield B. Primary care, income inequality, and self-rated health in the United
471 States: a mixed-level analysis. *International Journal of Health Services*. 2000; 30:3,
472 p541–555.
- 473 4. Shi L. The relationship between primary care and life chances. *Journal of Health Care*
474 *for the Poor and Underserved*. 1992; 3: 2, p321–335
- 475 5. Starfield B, Shi L, Macinko J. Contribution of primary care to health systems and health.
476 *Milbank Quarterly*. 2005; 83:3, p 457–502.
- 477 6. Rao M, Pilot E. The missing link--the role of primary care in global health. *Global health*
478 *action*. 2014;7:23693.
- 479 7. Stigler FL, Macinko J, Pettigrew LM, Kumar R, van Weel C. No universal health
480 coverage without primary health care. *Lancet (London, England)*. 2016;387(10030):1811.

8. Segall M. District health systems in a neoliberal world: a review of five key policy areas. The International journal of health planning and management. 2003;18 Suppl 1:S5.

9. Kruk ME, Chukwuma A, Mbaruku G, Leslie HH. Variation in quality of primary care services in Kenya, Malawi, Namibia, Rwanda, Senegal, Uganda and the United Republic of Tanzania. Bull World Health Organ. 2017;95(6):408-18.

10. Shi L, Starfield B, Xu J, et al. Primary care quality: community health center and health maintenance organization. South Med J. 2003 Aug; 96(8):787-95.

11. Hu R, Liao Y, Du Z, Hao Y, Liang H, Shi L. Types of health care facilities and the quality of primary care: a study of characteristics and experiences of Chinese patients in Guangdong Province, China. BMC Health Services Research.2016; 16:335. Available on :doi 10.1186/s12913-016-1604-2

12. Bresick G, Sayed A, le Grange C, Bhagwan S, Manga N, Hellenberg D. Western Cape Primary Care Assessment Tool (PCAT) study: Measuring primary care organization and performance in the Western Cape Province, South Africa (2013). Afr J Prm Health Care Fam Med. 2016;8(1), a1057. Available on:doi.org/10.4102/ phcfm.v8i1.1057

13. Government of Malawi: Ministry of Finance Economic Planning and Development. Malawi. Millennium Development Goals Report 2014. http://www.mw.undp.org/content/dam/malawi/docs/general/UNDP_MW_EDP_MDG_book_final.pdf (accessed on 28 April, 2018)

14. Abihiro G A, Mbera G B, De Allegri M. Gaps in universal health coverage in Malawi: A qualitative study in rural communities. BMC Health Services Research 2014 14:234. Available from <http://www.biomedcentral.com/1472-6963/14/234> (Accessed on 20 February, 2018)

15. Zere E, Moeti M, Kiringa J et al. Equity in health and healthcare in Malawi: analysis of trends. BMC Public Health. 2007; 7:78. Available from <http://www.biomedcentral.com/147-2458/7/78> (Accessed on 12 February, 2018)
16. Malawi Government Ministry of Health. Health Sector Strategic Plan II 2017 - 22: Lilongwe, 2017. Available on www.health.gov.mw/index.php/policies-strategies?download=47:hssp-ii-final (Accessed on 21 July, 2017)
17. von Elm E, Altman DG, Egger M, Pocock SJ, Gotsche PC, Vandenbroucke JP. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement: guidelines for reporting observational studies. BMJ. 2007 Oct 20;335(7624):806-8. DOI: 10.1136/bmj.39335.541782.AD
18. WHO. Health sector resource mapping: increasing access to information for decision making. World Health Organization, Geneva 2013. Available on http://www.who.int/pmnch/media/events/2013/resource_mapping.pdf (accessed on 20th January, 2018)
19. Fracolli L A, Gomes M F P, Nabão F R Z, Santos M S, Cappellini V K, de Almeida A C C. Primary health care assessment tools: a literature review and metasynthesis. Ciênc. saúde coletiva [Internet]. 2014 Dec; 19(12): 4851-4860. Available from: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1413-81232014001204851&lng=en. <http://dx.doi.org/10.1590/1413-812320141912.00572014>.
20. Starfield B, Xu J, Shi L. Validating the Adult Primary Care Assessment Tool. The Journal of Family Practice 2001; 50(2):161-175
21. Yang H, Shi L, Lebrun L, et al. Development of the Chinese primary care assessment tool: data quality and measurement properties. Int J Qual Health Care. 2013;25(1):92–105. 32.

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22. Lee JH, Choi YH, Sung NJ, et al. Development of the Korean primary care assessment tool—measuring user experience: tests of data quality and measurement performance. *Int J Qual Health Care*. 2009;21(2):103–11. 33.

23. Berra S, Rocha K B, Rodríguez-Sanz M, Pasarín M I, Rajmil L, Borrell C and Starfield B. Properties of a short questionnaire for assessing Primary Care experiences for children in a population survey. *BMC Public Health* 2011, 11:285
<http://www.biomedcentral.com/1471-2458/11/285>

24. Haggerty JL, Burge F, Beaulieu MD, Pineault R, Beaulieu C, Levesque JF, et al. Validation of instruments to evaluate primary healthcare from the patient perspective: overview of the method. *Health Policy*. 2011;7(Spec Issue):31–46.
<http://dx.doi.org/10.12927/hcpol.2011.22691>

25. Bresick G, Sayed A, Le Grange C, et al. Adaptation and cross-cultural validation of the United States primary care assessment tool (expanded version) for use in South Africa. *Afr J Prim Health Care Fam Med*. 2015;7(1)

26. Dullie L, Meland E, Hetlevik Ø, Mildestvedt T, Gjesdal S. Development and validation of a Malawian version of the primary care assessment tool. *BMC Family Practice*. 2018; 19:63. Available on: doi.org/10.1186/s12875-018-0763-0

27. Starfield, B. Primary care: balancing health needs, services, and technology (Rev. ed.). New York, 1998: Oxford University Press

28. Aoki T, Inoue M, Nakayama T. Development and validation of the Japanese version of Primary Care Assessment Tool. *Family Practice*. 2016. 33:1, 112–117
[doi:10.1093/fampra/cmz087](https://doi.org/10.1093/fampra/cmz087)

29. Macinko J, Almeida C, Klingelhofer de Sa P. A rapid assessment methodology for the evaluation of primary care organization and performance in Brazil. *Health Policy Plan.* 2007; 22:167–177. Available on: doi.org/10.1093/heapol/czm008
30. Wroe E B, Dunbar E L, Kalanga N, Dullie L, Kachimanga C, Mganga A et al. Delivering comprehensive HIV services across the HIV care continuum: a comparative analysis of survival and progress towards 90-90-90 in rural Malawi. *BMJ Glob Health* 2018;3:e000552. doi:10.1136/bmjgh-2017-000552
31. Mays GP, Smith SA. Evidence links increases in public health spending to declines in preventable deaths. *Health Affairs* 2011; 30(8): 1585–93
32. Bein MA, Unlucan D, Olowu G, Kalifa W. Healthcare spending and health outcomes: evidence from selected East African countries. *Afri Health Sci.* 2017;17(1): 247-254. <https://dx.doi.org/10.4314/ahs.v17i1.30>
33. Makaula P, Bloch P, Banda H T, Bongololo G M, Mangani C, de Sousa A et al. Primary health care in rural Malawi - a qualitative assessment exploring the relevance of the community-directed interventions approach. *BMC Health Services Research* 2012, 2:328. Available on <http://www.biomedcentral.com/1472-6963/12/328>
34. Kristjansson E, Hogg W, Dahrouge S, Tuna M, Mayo-Bruinsma L, Gebremichael G. Predictors of relational continuity in primary care: patient, provider and practice factors. *BMC Fam Pract.* 2013;14:72.
35. World Health Organization. Arguing for universal health coverage. Available on http://www.who.int/health_financing/UHC_ENvs_BD.PDF. WHO, 2013. Geneva (Accessed on 14 December, 2018).

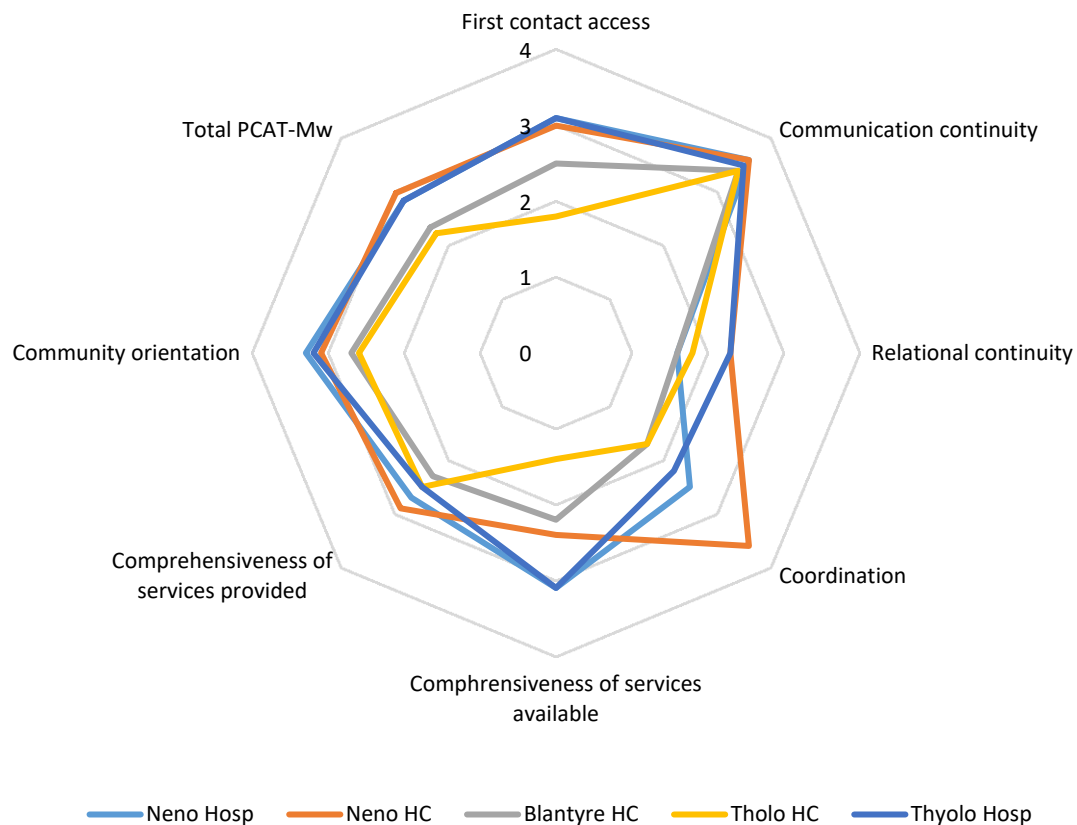
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36. Kringos D S, Boerma W G W, Hutchinson A, van der Zee1 J, Groenewegen P P. BMC
Health Serv Res. 2010; 10:65. <http://www.biomedcentral.com/1472-6963/10/65>

37. Hogg W, Rowan M, Russell G, Geneau R and Muldoon L. Framework for primary care
organizations: the importance of a structural domain. International Journal for Quality in
Health Care 2008; Volume 20, Number 5: pp. 308–313

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Figure 1. Mean primary care attribute scores among patients attending outpatient clinics in South West health zone, Malawi, in July and August, 2018 shown by hospitals and health center clinics.



The Malawian version of the Primary care assessment tool (PCAT-Mw)

Dullie et al. BMC Family Practice (2018) 19:63 <https://doi.org/10.1186/s12875-018-0763-0>

First contact access (3 items)

1. When this HC is closed on Saturday and Sunday and you get sick, would someone from here see you the same day?
2. When the HC is closed and you get sick during the night, would someone from here see you that night?
3. Is there a complaints / suggestion box at this HC?

Communication continuity of care (4 items)

1. Is the staff friendly and approachable?
2. Do you think the staff at this HC understands what you say or ask?
3. Are your questions answered in a way that you understand?
4. Does this HC give you enough time to talk about your problems or worries?

Relational continuity of care (4 items)

1. Does this HC know you very well as a person, rather than as someone with a medical problem?
2. Does this HC know who lives with you?
3. Does this HC know your complete medical history?
4. Does this HC know about your work or employment?

Coordination (3 items) Lead questions confirm if patient has ever been referred in the previous six months

1. Does this HC know what the results of the visit were?
2. After you went to the specialist or hospital, did this HC talk with you about what happened at that visit?
3. Does this HC seem interested in the quality of care that you get from that specialist or hospital?

Comprehensiveness of services available (6 items)

1. Checking hearing
2. Dental check-up – checking and cleaning your teeth
3. Treatment by dental therapist eg extraction of bad teeth
4. Counseling for mental health problems
5. Plastering of fractures
6. Treatment of ingrown toe nails or removing part of a nail

Comprehensiveness of services provided (6 items)

1. Advice on wearing reflectors when walking on the road at night
2. How to prevent hot burns
3. Advice about appropriate exercise for you
4. Advice on how to prevent accidental falls
5. Ways to handle family conflict; arguments; disagreements (that may arise from time to time)
6. Possible exposure to harmful substances in your home, at work or in your area e.g. paraffin; pesticides?

Community orientation (3 items)

1. Do you think this HC knows about the important health problems of your area?
2. Does this HC get opinions and ideas from people or organizations with knowledge to help provide better health care? E.g. the local health committee, churches, other organizations?
3. Does this HC do surveys of patients to see if services are meeting the needs of the people?

Reporting checklist for cross sectional study.

Based on the STROBE cross sectional guidelines.

Instructions to authors

Complete this checklist by entering the page numbers from your manuscript where readers will find each of the items listed below.

Your article may not currently address all the items on the checklist. Please modify your text to include the missing information. If you are certain that an item does not apply, please write "n/a"

Upload your completed checklist as an extra file when you submit to a journal.

In your methods section, say that you used the STROBE cross sectional reporting guidelines, and cite them as:

von Elm E, Altman DG, Egger M, Pocock SJ, Gøtzsche PC, Vandenbroucke JP. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement: guidelines for reporting observational studies.

			Page
Reporting Item			Number
Title	#1a	Indicate the study's design with a commonly used term in the title or the abstract	1
Abstract	#1b	Provide in the abstract an informative and balanced summary of what was done and what was found	2 - 3

1	Background /	#2	Explain the scientific background and rationale for the	3 - 5
2				
3	rationale		investigation being reported	
4				
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6	Objectives	#3	State specific objectives, including any pre-specified	5
7			hypotheses	
8				
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11	Study design	#4	Present key elements of study design early in the paper	5
12				
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15	Setting	#5	Describe the setting, locations, and relevant dates, including	5 - 6
16			periods of recruitment, exposure, follow-up, and data	
17			collection	
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22	Eligibility criteria	#6a	Give the eligibility criteria, and the sources and methods of	6
23			selection of participants.	
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28		#7	Clearly define all outcomes, exposures, predictors, potential	8
29			confounders, and effect modifiers. Give diagnostic criteria, if	
30			applicable	
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35	Data sources /	#8	For each variable of interest give sources of data and details	7
36	measurement		of methods of assessment (measurement). Describe	
37			comparability of assessment methods if there is more than	
38			one group. Give information separately for for exposed and	
39			unexposed groups if applicable.	
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47	Bias	#9	Describe any efforts to address potential sources of bias	20
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51	Study size	#10	Explain how the study size was arrived at	6 - 7
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Quantitative variables	#11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen, and why	8 – 9
Statistical methods	#12a	Describe all statistical methods, including those used to control for confounding	8 - 9
	#12b	Describe any methods used to examine subgroups and interactions	8 - 9
	#12c	Explain how missing data were addressed	8
	#12d	If applicable, describe analytical methods taking account of sampling strategy	8 - 9
	#12e	Describe any sensitivity analyses	N/A
Participants	#13a	Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed. Give information separately for exposed and unexposed groups if applicable.	9
	#13b	Give reasons for non-participation at each stage	9
	#13c	Consider use of a flow diagram	N/A
Descriptive data	#14a	Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders. Give information separately for exposed and unexposed groups if applicable.	10

	#14b	Indicate number of participants with missing data for each variable of interest	9
Outcome data	#15	Report numbers of outcome events or summary measures. Give information separately for exposed and unexposed groups if applicable.	12 - 15
Main results	#16a	Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	N/A
	#16b	Report category boundaries when continuous variables were categorized	N/A
	#16c	If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	N/A
Other analyses	#17	Report other analyses done—e.g., analyses of subgroups and interactions, and sensitivity analyses	16
Key results	#18	Summarise key results with reference to study objectives	16 - 17
Limitations	#19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias.	20
Interpretation	#20	Give a cautious overall interpretation considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence.	17 - 19

Generalisability	#21	Discuss the generalisability (external validity) of the study results	21
Funding	#22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	24

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